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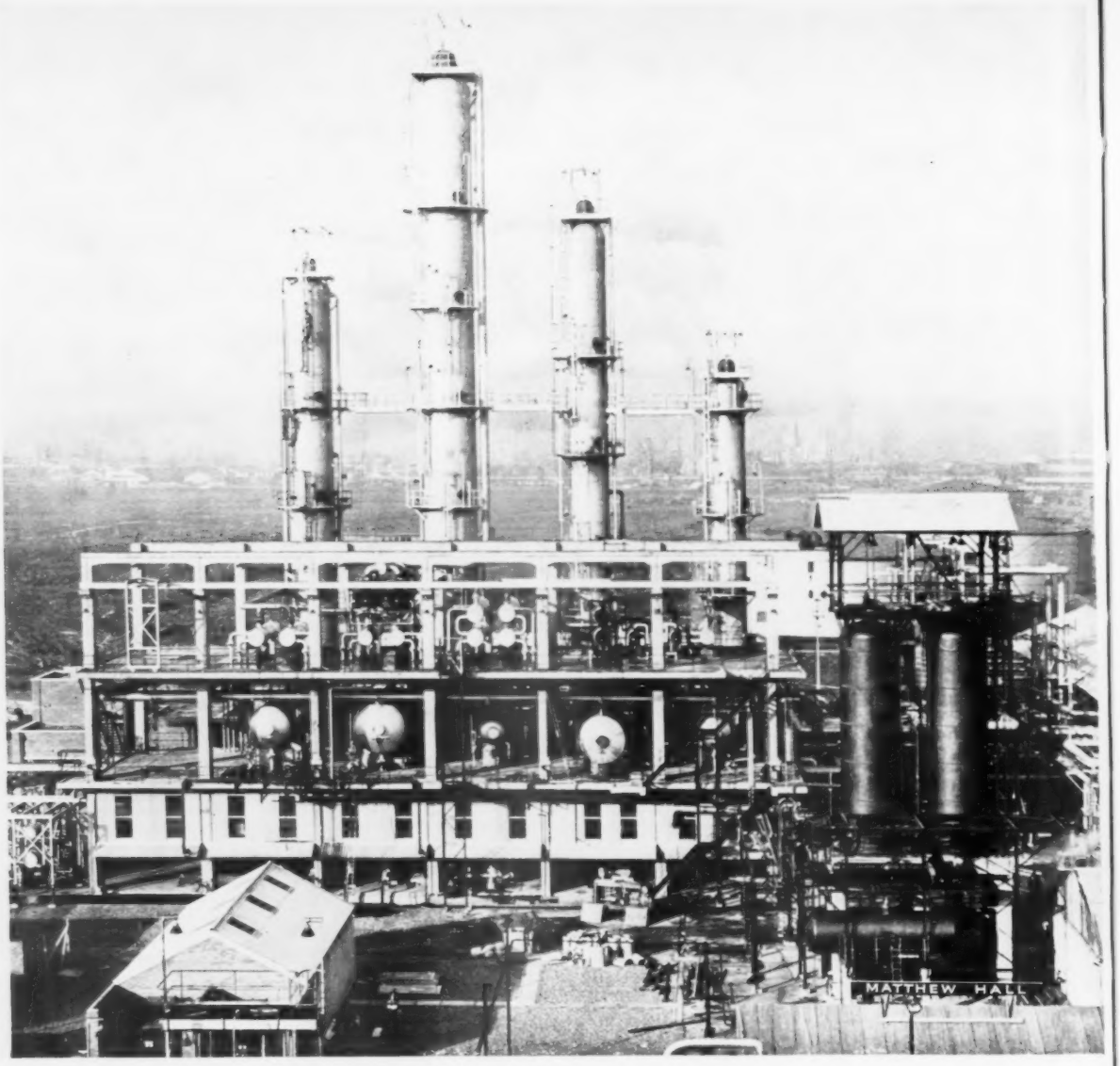

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Vol. 9, No. 105 **September 1955**

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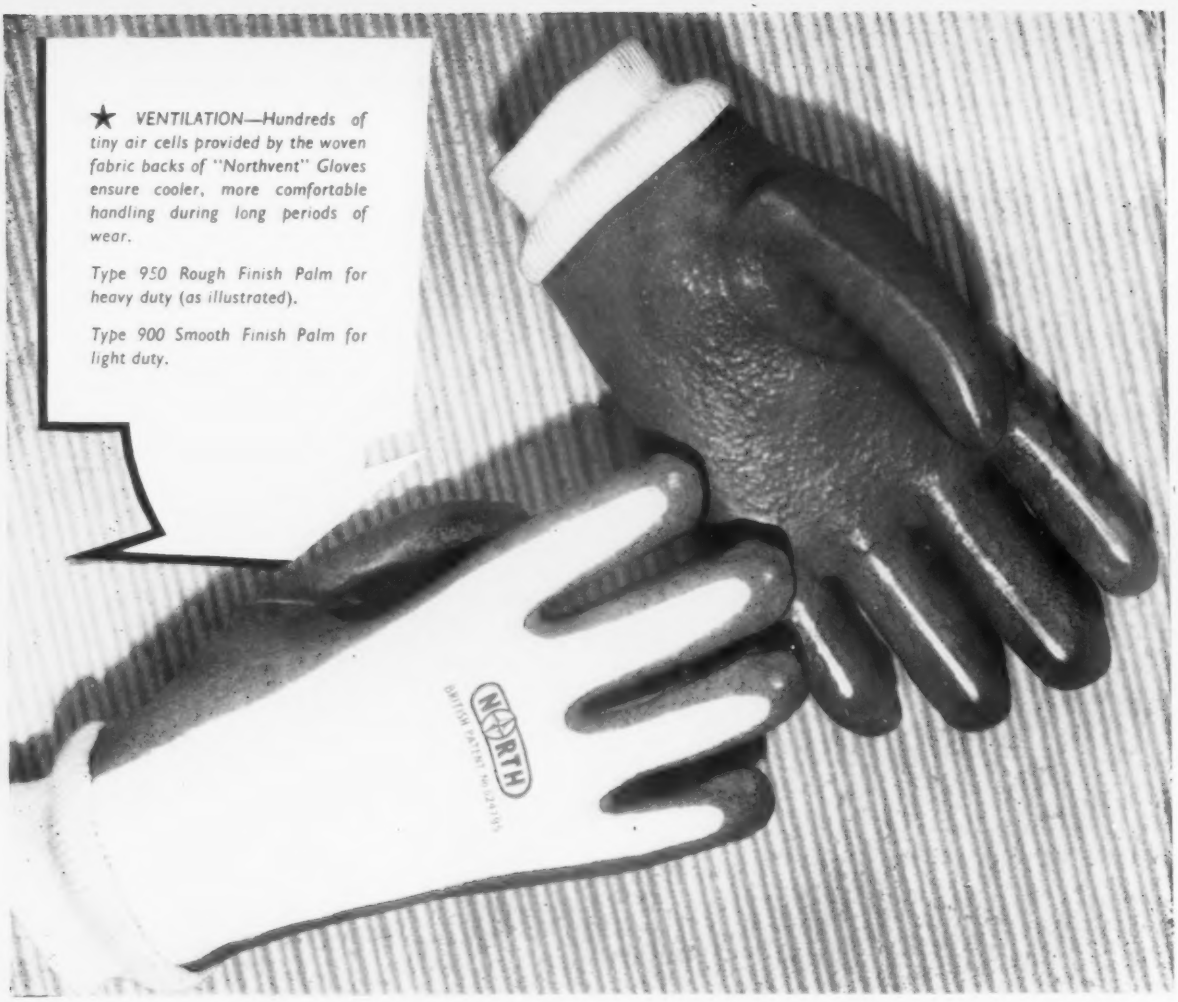
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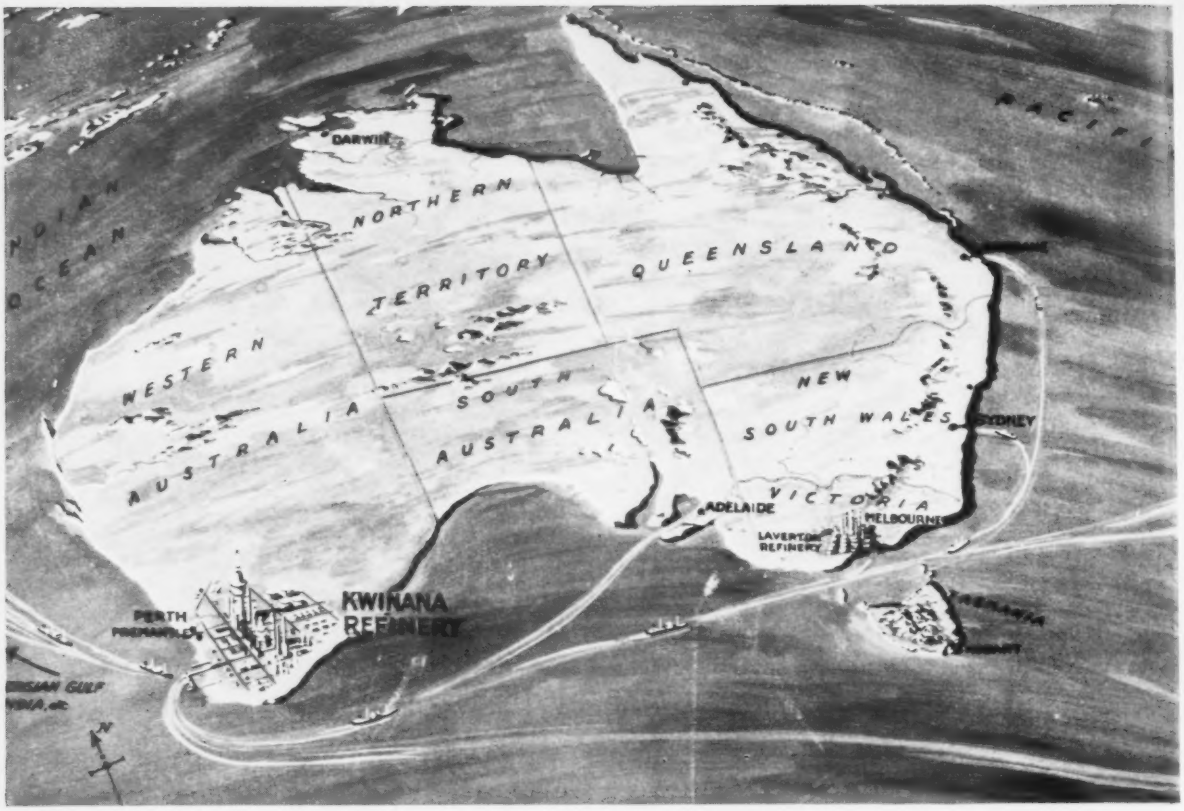

British Petroleum

NEIGHBOUR—*Only 17 miles from Kwinana is Fremantle, main port of Western Australia—a city which will grow as Kwinana grows.*

AS ENGINEERS and prime contractor for the Kwinana refinery in Western Australia. The Kellogg International Corporation are justifiably proud of their latest contribution to British Petroleum Company's global operations. But the opportunity to design and build the vast undertaking is attributable to the foresight of British Petroleum and the faith it has in Australia and especially the future of Western Australia.

WE SALUTE those who conceived Kwinana, as well as the various government authorities whose help made possible this important aid to the economy of Australia. With Kwinana in operation, this refinery alone is expected to meet over 50% of the continent's requirements for refined petroleum products and with existing refinery facilities, soon make Australia self-sufficient in this respect.

THE MAXIMUM labour force was about 3,500 men, which included ten different nationalities: 3,100 British, of whom 2,700 were Australians, 282 Others, who included the following nationalities: German, Dutch, Yugoslav, Polish, Greek, Austrian, Italian and Ukranian. Some 320 shipments by ocean were made from the United Kingdom, using about 200 different ships. The average time

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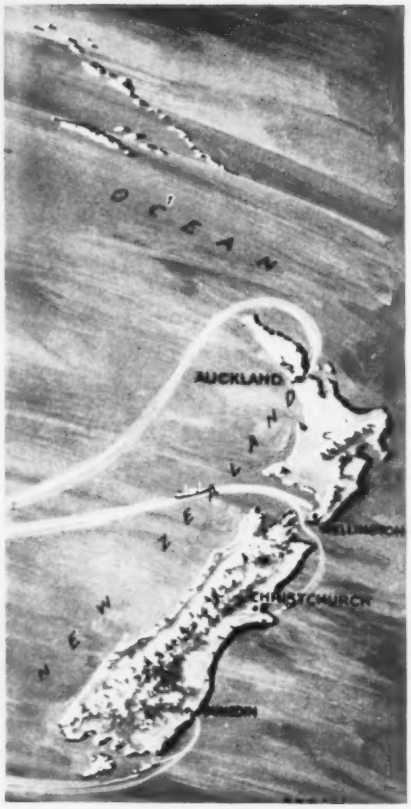
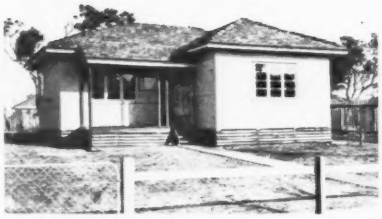


THE NEW—*One town born of Kwinana is Medina. Photograph shows one of the houses that has been erected for workers at the refinery.*



THE OLD—*Perth, capital of Western Australia, not far from Kwinana, already benefits from its new neighbour.*

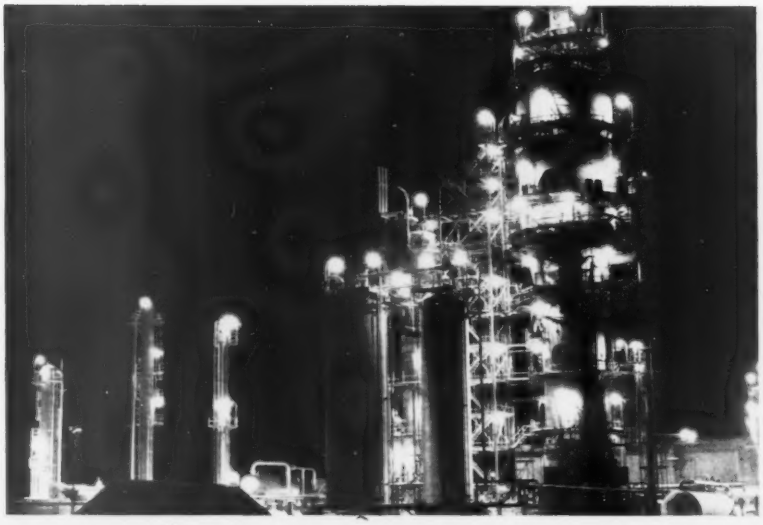
helps a Continent grow

taken in transport varied from 4 to 6 weeks. The distance from England to Fremantle is about 10,000 miles.

FULL CREDIT must be given also to Costain-John Brown, Kinnear Moodie, and D & C & Wm Press Ltd—the British consortium known as Kwinana Construction Group and the hundreds of suppliers. These firms ail co-operated with Kellogg International Corporation to build the Kwinana refinery.

TO THE thousands of men who participated in getting Kwinana on stream ahead of schedule, The Kellogg International Corporation says 'many thanks for a job well done'.

TODAY—*Lights twinkle at Kwinana as the refinery goes on stream at the rate of 22,000,000 barrels annually.*



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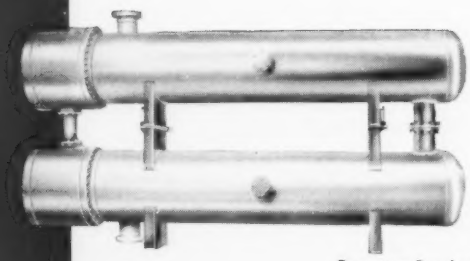
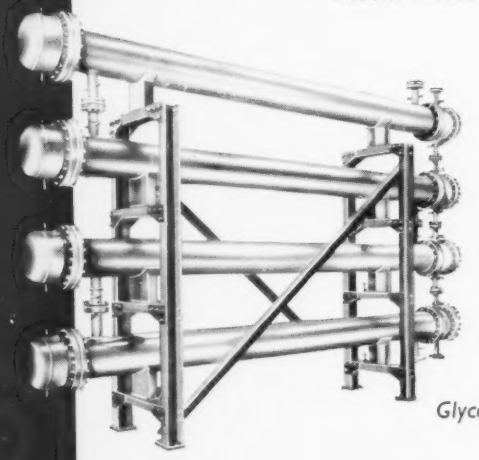
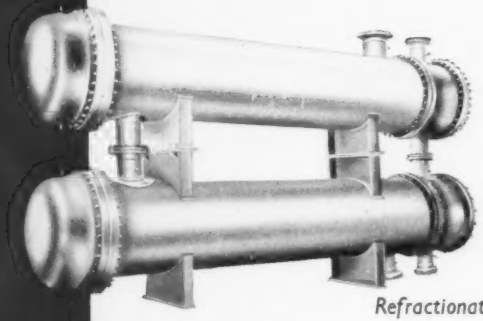


Reactor Products Condenser



Glycol Exchanger



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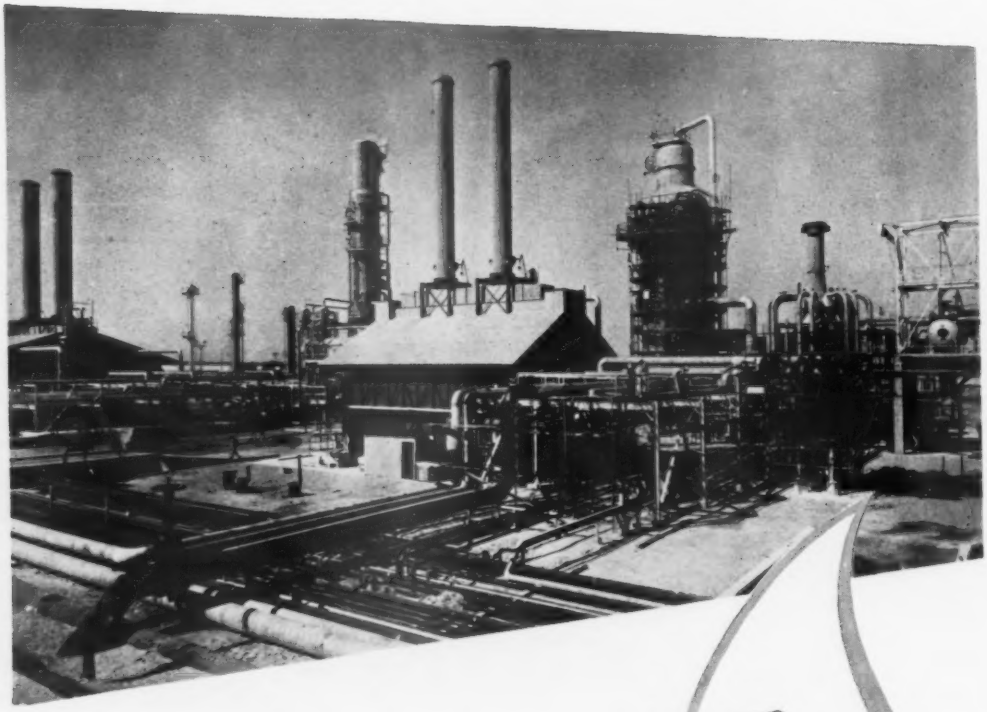
Peabody at KWINANA



WHETHER the duty to be met is the constant demand for power or the widely fluctuating needs of refinery processes, the Peabody Burner will always be more than sufficient for the task.

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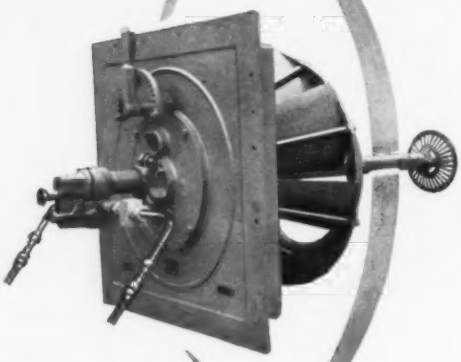

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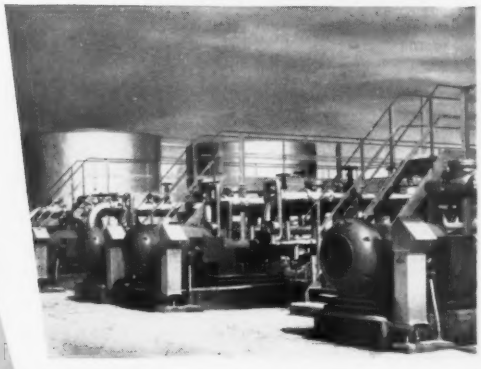

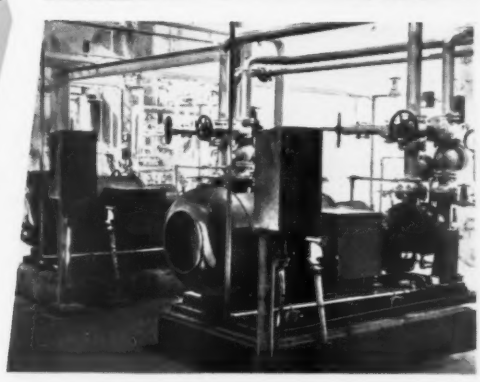

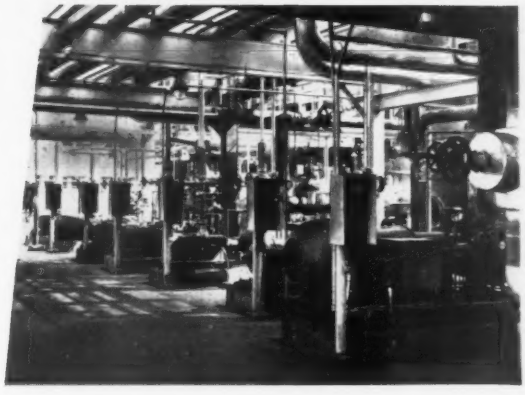

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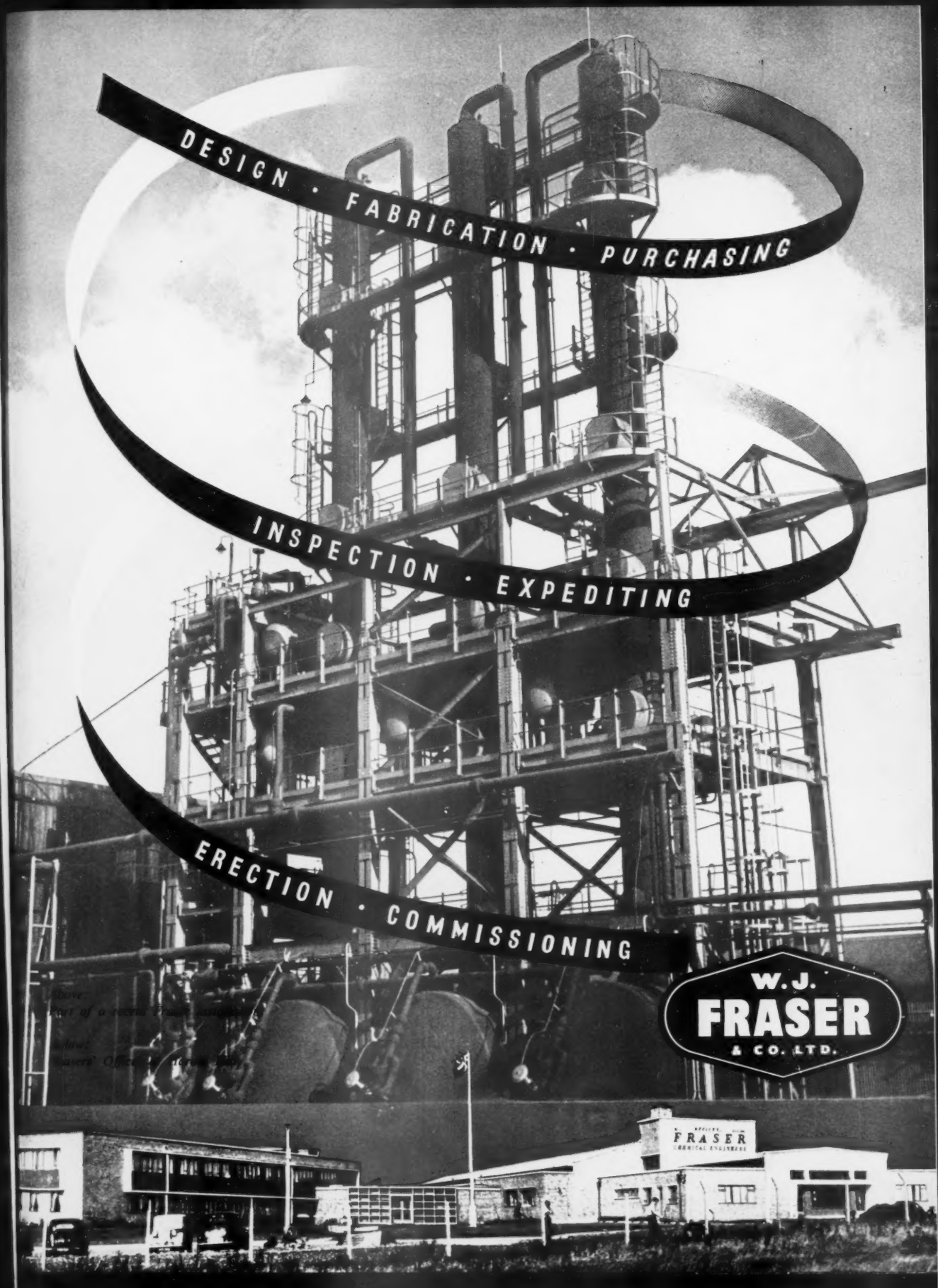

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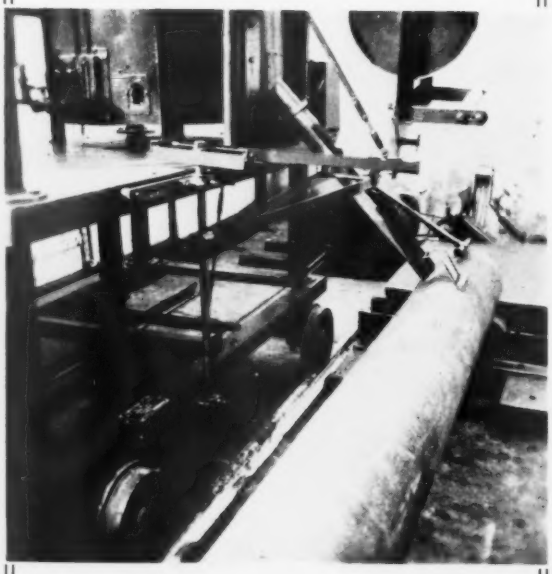

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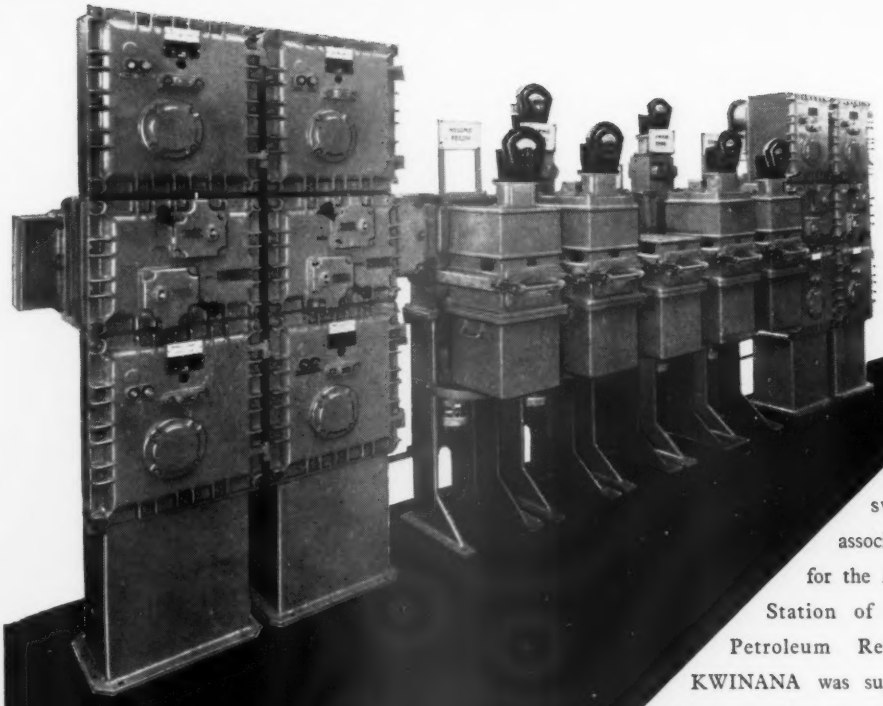

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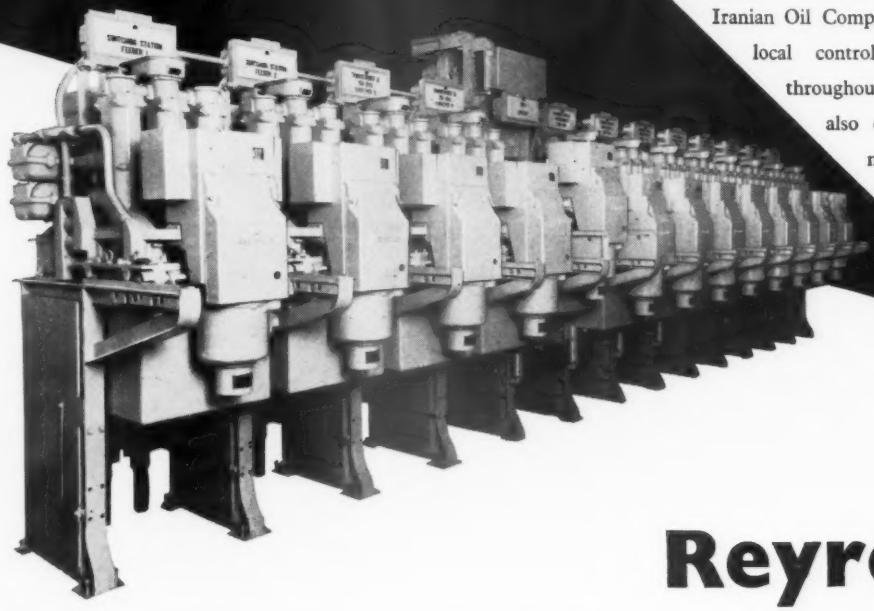

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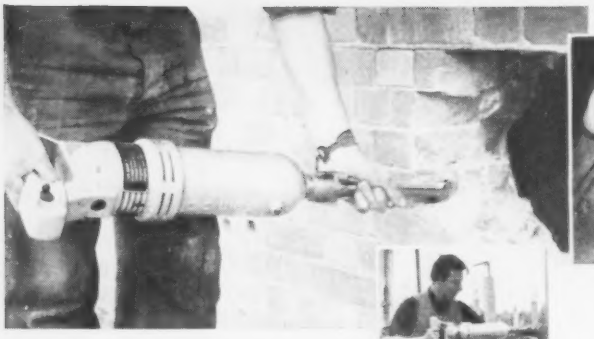

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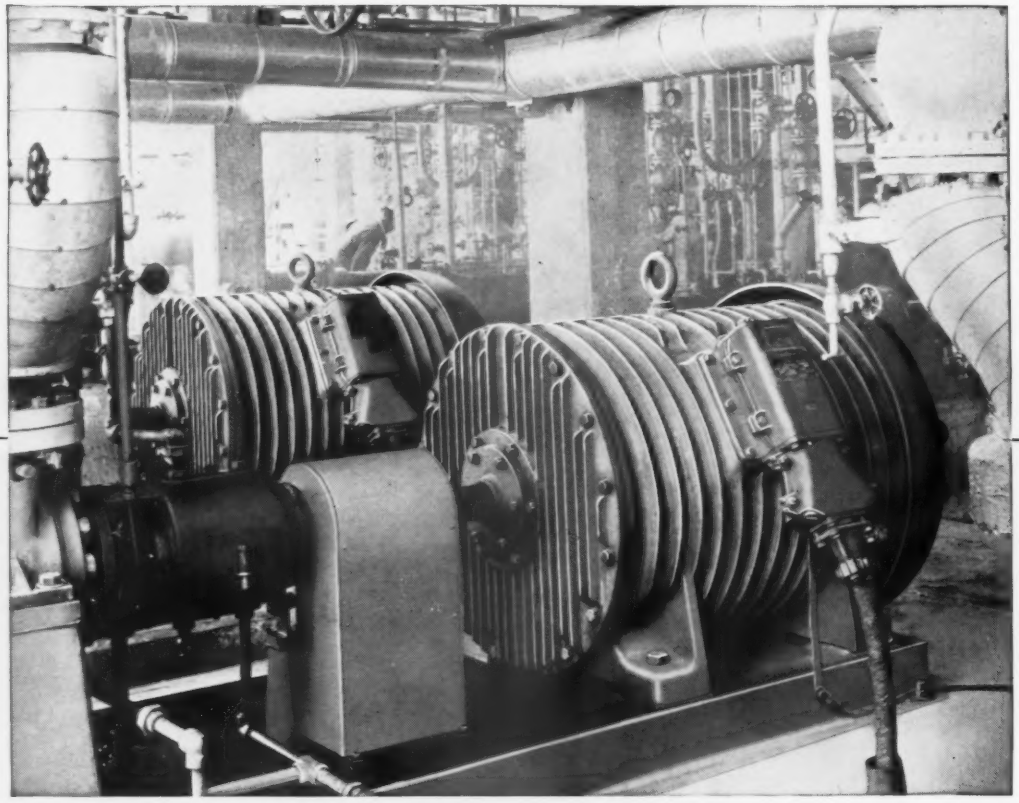
Flame-proof motors at Coryton Refinery



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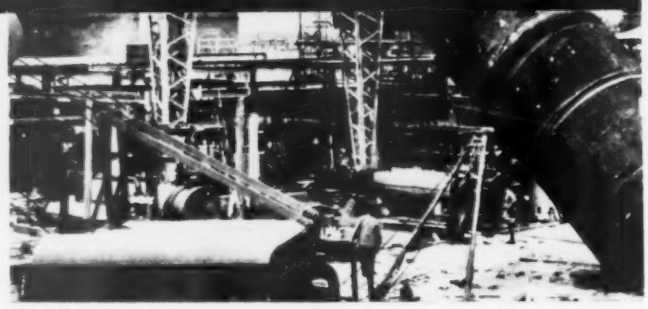

CIMENT FONDU with a porous fireclay aggregate has been used as a gunited application to insulate Crude towers at the Kwinana Refinery. The tower illustrated is 100 ft. high and has an erection weight of 125,000 lbs. Photograph by courtesy of The British Petroleum Company Limited.

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whence Kwinana?

June, 1921 . . . deep winter in southern latitudes. The freighter *Kwinana* was driven by an unprecedented gale on to the beach in Cockburn Sound.

Thirty-one years after the disaster, the bush gave way before machines, and a refinery started taking shape. By 1956 the new enterprise will be treating 3,000,000 tons of petroleum products a year. Lofty steel columns overshadow the rusted iron hulk on the shore; but the old ship's name rings round the world.

Kwinana Refinery was designed by the M.W. Kellogg Company and their British subsidiary, the Kellogg International Corporation, for Australasian Petroleum Refinery Limited, an associate of the British Petroleum Co. Ltd. Actual construction of the £A 40,000,000 project was entrusted to a consortium of three British contractors known as the Kwinana Construction Group. One member of that consortium is D & C and William Press Limited.

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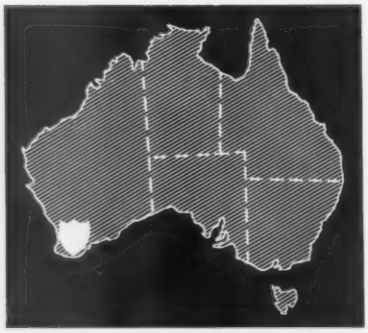

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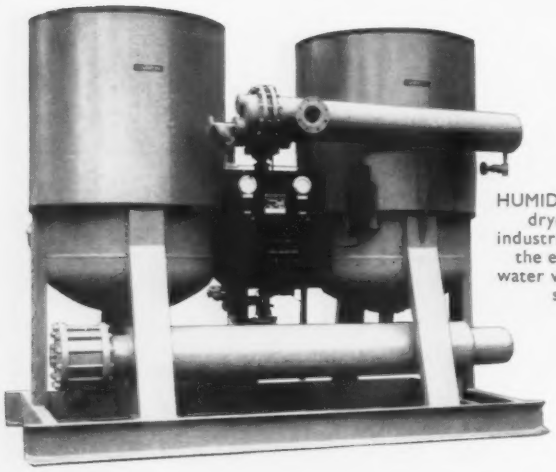

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B.P.'s

Kwinana Refinery

"A pretty fast maiden", commented "The Economist", when it became known that British Petroleum's Kwinana refinery in Western Australia would be completed and on-stream well ahead of schedule. (Kwinana is the aboriginal term for "pretty maiden").

As it turned out, the maiden lived up to the best expectations of her potential speed. Kwinana refinery started up on 1 February 1955, when the first distillation unit was commissioned—more than three months before the scheduled time. All plant and administrative buildings were taken over from the contractors on or before this date, and the remaining units were commissioned within two months.

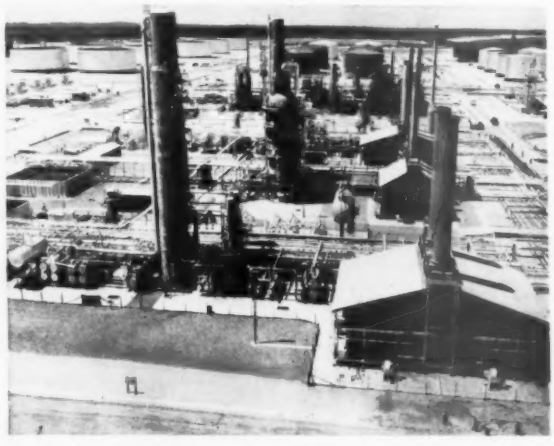
Kwinana refinery stands on Cockburn Sound some 17 miles south of the inner harbour at Fremantle, the "Western Gateway" to Australia. With its capacity of 3,000,000 tons of crude oil a year, it is the largest refinery now operating in Australasia, and its product output will be of the following order, the actual figures depending on market requirements.

	Tons per annum
Motor spirit	660,000
Diesel and gas oils	440,000
Aviation turbine fuel	120,000
Kerosine	120,000
Fuel oil	1,550,000

The operating company is Australasian Petroleum Refinery Limited (one of B.P.'s Australian associates).

Before considering the factors which contributed to its rapid construction, the "why and wherefore" of Kwinana should be noted.

In 1950 B.P. decided to build a refinery somewhere in Australia to meet the expanding marketing requirements of its associates, Commonwealth Oil Refineries Limited and



General view of the refinery from the catalytic cracker plant.

The British Petroleum Company of New Zealand. In October 1951 a party of experts was sent from B.P.'s London office to choose a suitable site. C.O.R. and the Western Australian Government pointed to the merits of Cockburn Sound as a harbour and of Kwinana as a refinery site.

Cockburn Sound, the London experts were quick to note, offered a nearly landlocked harbour. After a channel had been dredged through the Success and Parmelia sandbanks, the largest tankers would be able to berth in sheltered waters at the refinery's jetties.

As for the Kwinana site, it consisted of low-lying scrubland immediately adjacent to the foreshore, where an oil port could be built. The load-bearing qualities of the soil were excellent and little levelling would be needed.

Other points which influenced the experts' decision to choose Kwinana were that the refinery would be at the nearest point in Australia for tankers bringing crude oil from the Persian Gulf, the prospective source of supply; that the Company already had a big ships' bunkering trade at Fremantle; and that the Western Australian Government was ready to undertake the necessary dredging to open up Cockburn Sound to tankers, and to provide housing and other ancillary services.

The Work of Construction

So in November 1952 the first sub-contracts were let for such jobs as preliminary scrub-clearing and fencing, four miles of which were needed to enclose the 950 acre site. After the Christmas holidays, preparatory work was intensified and on 29 January 1953, Sir Ross McLarty, then Premier of Western Australia, turned the first turf with a silver spade to mark officially the start of construction. Next month the first shipment of materials arrived. In April work on concrete foundations got under way. In September the skyline was vigorously altered by the erection of the first tower.

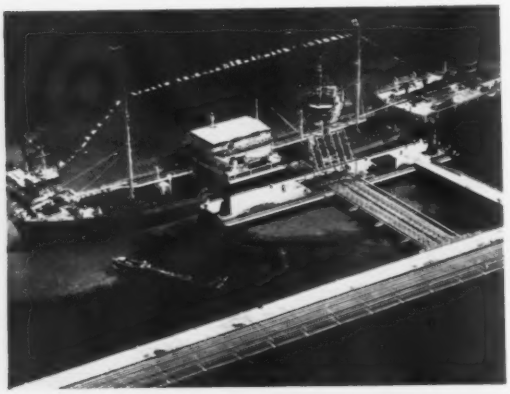
And so it went on until the arrival of the first tanker, loaded with crude oil, on 11 January 1955 and the bringing of the refinery on stream on 1 February.

What were the main factors in the smooth and rapid construction of Kwinana? They may be grouped in this way:—

1. There was complete understanding and co-operation between Australasian Petroleum Refinery Limited, the Kellogg International Corporation (the overall contractors) and the consortium of United Kingdom companies building the refinery—Costain-John Brown Limited, D and C and William Press Limited, and Kinnear Moodie Limited. Australian contractors were similarly most helpful.

2. There were no serious delays in material supplies from the United Kingdom, Australia, and America. A team of

"expeditors"—men whose job it was to see that materials left the factories as quickly as possible—was employed by the contractors and was largely responsible for this smooth flow of materials. Care was also taken that materials arrived in a planned sequence, so that, for example, the roof of a storage tank did not arrive on the site before the bottom and sides.



Arrival of the first tanker, "British Crusader", at No. 1 Jetty, Kwinana refinery.

3. The decision in 1952 by the Australian Federal Government to reduce capital expenditure had the double effect on the original project programme of:

(*a*) Making more materials available in Australia, thus saving transport costs and time.

(*b*) Making labour less difficult to obtain in Australia. It was originally believed that 2000-2500 men would need to be sent from the United Kingdom to fill labour force requirements of 3500 on the site. In fact, only 187, including 78 high-grade welders and cable jointers, were despatched specially from the United Kingdom. In addition, 484 migrants from the United Kingdom and European countries were engaged upon their arrival at Perth and trained on the site for the particular jobs they were to do. Nearly 3000 were engaged at recruiting offices in Western Australia and in the Eastern States.

4. The men leading the main construction team had worked together on the expansion of B.P.'s Scottish refinery at Grangemouth in 1951-52. The men in charge of the jetty construction had worked together in Persia.

The contributions of the Western Australian Government must also be recorded. In addition to the dredging of Cockburn Sound and the building of houses (of which more later) the Government also provided a new 20,000,000 gallon-reservoir and 21 miles of large-diameter piping for water supply, as well as electric power lines and roads.

Visitors to Kwinana in recent months have found that, with good reason, the team who built it refuse pride of place to any other refinery construction project of similar magnitude. The harmony within that team of 3500 (at the peak of construction) is exemplified by the fact that only 22 man-days were lost as the result of stoppage of work.

Visitors have also remarked on the compactness of Kwinana—the economical placing of plant, oil port, tank farm, administrative and amenity buildings etc. Only 250 acres of the 950 acre site are so far put to these uses.

Kwinana is designed to manufacture a full range of products —motor spirit of premium and regular grades, kerosine, diesel, fuel oils, and bitumen. The two distillation units each have a capacity of 1,500,000 tons a year. Other plant includes a catalytic cracker, a vacuum unit, a platformer, a hydrofiner, and copper chloride sweetening units.

Two units require special mention. The "cat cracker" is of the "orthoflow" design, whereby both reactor and regenerator are housed in the same column, thus giving economy of construction and operation. This is the first "cat cracker" of such design to be installed in one of B.P.'s refineries.

Another unit making its first appearance in a B.P. refinery is the hydrofiner. This employs a desulphurizing process developed at B.P.'s Sunbury Research Station. At Kwinana the feedstock is a mixture of kerosine and light and heavy straight-run gas oils. The feedstock, together with hydrogen, is passed over a catalyst at a temperature of 780°F and a pressure of 1000 lb to the square inch. The sulphur in the feed is removed as H_2S. A small amount of cracking takes place, but more than 95 per cent of the feed is recovered as gas oil of low sulphur content.

To meet the increasing demand in Australia for "bottled gas", a liquid petroleum gas bottling plant is to be installed at the refinery.

Butane gas will be taken from the distillation units, and, after treatment, will be filled into containers at the bottling plant. The plant will be capable of filling containers of 32 lb, 100 lb, and one ton, and will also include a filling point for bulk vehicle loading.

Work on the unit is expected to start towards the end of the year.

The Jetty

Another important feature of Kwinana is the L-shaped jetty with its three T heads, each of them capable of accommodating simultaneously a 32,000-dwt tanker. Designers of this structure, which overall is almost a mile in length, were Messrs Rendel, Palmer and Tritton. As with the refining plant, the keynote was speed: the use of much material prefabricated on site enabled the jetty to be completed within 16 months.

It is from this jetty that more than half of Kwinana's products are dispatched by tanker to the markets of Australia and New Zealand. But another means of distribution is by two 17-mile pipelines—one 12 inches and the other 6 inches in diameter—from the refinery to Fremantle. They were laid as part of the refinery construction plan.

Medina's modern shopping centre.

Through the 12-inch pipeline fuel oil is pumped to ships' bunkering installations at Fremantle. The 6-inch pipe carries motor spirit to other installations for distribution by C.O.R. to the hinterland of Western Australia.

Such a construction project as Kwinana naturally provided drawing offices in various centres with plenty of work. Its scope may be exemplified by the fact that at Kwinana 150,000 reproductions of plans received from contractors or drawn on site were made, using up 40 miles (or 23 acres) of sensitized paper!

The coming of Kwinana refinery has given a big impetus to the industrial development of Western Australia. Already a large steel-rolling mill and a cement works have been built nearby, and other projects are expected to follow. The Kwinana district is, in fact, envisaged as a brand-new industrial area by the Western Australian authorities, who have taken steps to see that it gets away to a well-planned start.

Two and a half miles inland from the refinery they chose a site of virgin scrub and woodland for a completely new town to house workers in the neighbourhood. Their initial task was to build houses for those employed at the refinery. Some 600 have been completed, with attractive coloured roofs and plenty of garden space. They have been built in two "units" known (after ships which brought early settlers to Western Australia) as Medina and Calista. These are the first of four such units which together will form the town of Kwinana, with an estimated population of 25,000. The plan is capable of extension to embrace three more units which would bring the town's population up to 40,000.

Though houses for refinery personnel have perforce come first, every effort is being made to avoid the creation of an "oil town". The main town centre of Kwinana has been begun, to encourage the business life of the town to concentrate and grow in its final location. A local centre with shops, cinema etc., has already been built for Medina. This, however, is only intended to serve local needs, as the main town centre is little more than half-a-mile away.

Thus, as the town of Kwinana grows, the refinery workers will form part of a community not exclusively concerned with oil affairs. Progress achieved so far makes it seem a far cry from the days when the first surveyors for the new town used to be attacked in their trucks or chased up trees by an indignant local resident—a black stallion running wild!

So a new refinery—the fourteenth—has been added to the B.P. Group's network of refineries operating in eight countries. Its speedy construction has been a credit to all concerned, and its coming into operation offers a wider industrial future to a State hitherto not over-endowed with large-scale enterprises—Western Australia.

Kwinana Refinery Comes "On-stream"

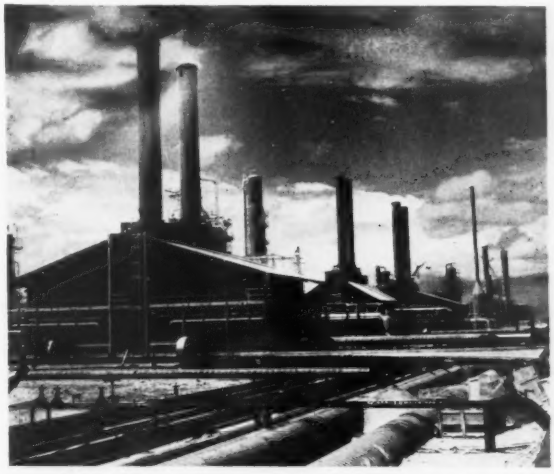
A general picture of the construction of Kwinana refinery and of its important role in the industrial development of Western Australia has been given in the preceding paragraphs.

Kwinana refinery follows the normal scheme of a modern refinery of its size, its processing units including two 35,000-b.s.d. atmospheric distillation units, a 24,000-b.s.d. vacuum distillation unit, a platformer, a 12,500-b.s.d. Orthoflow* fluid catalytic cracker, a hydrofiner, a bitumen manufacturing plant, and five copper chloride treaters. Therefore, in preference to reiterating the technical features of the various units which go to make up the refinery the following description of the operations which lie behind the bringing on-stream of such a refinery has been written with the help of material supplied by the technical staff of The M. W. Kellogg Company and the Kellogg International Corporation.

March, 1955 marked the first time that all the process units in Kwinana refinery came on-stream together. Obviously, a vast amount of work was necessary, once the construction phase was completed, before this stage of operation could be reached.

*"Orthoflow" is a trade-mark of The M. W. Kellogg Company.

Before the atmospheric distillation plant could be started up, usual practices had to be attended to—pipelines in the tank farm were flushed to clear them of foreign matter, pumps and valves were checked, and crude oil was analysed and approved for processing. Cold oil was circulated through the plant itself, in accordance with standard practice, for breaking-in pumping equipment.



The furnaces of the atmospheric distillation plant.

The equipment in the solutizer section was pickled, using aqueous (2 per cent weight) phosphoric acid and then water-washed to clean the equipment thoroughly before the introduction of the solutizer solution. The initial solutizer solution charged was prepared in batches in a mix tank, paddle-mixed until homogeneous, and then transferred to a balance tank. This batch procedure was continued until the volume of solution required for operation of the unit was acquired. Levels were then established in the solutizer in preparation for the introduction of gasoline feed from the atmospheric distillation unit.

Crude oil was then allowed to flow to the crude tower and a closed loop circulation was established. Furnace-firing was

Vacuum distillation area from South West.

begun and as distillation progressed in the tower, crude feed was added intermittently to maintain levels. Side-stream and intermediate reflux flows were started, and when the furnace temperatures reached the value required for proper distillation in the tower, the closed loop circulation was discontinued and a steady feed rate established.

After the crude fractionation system had been established, the solutizer section was placed in operation and the debutanizer commissioned.

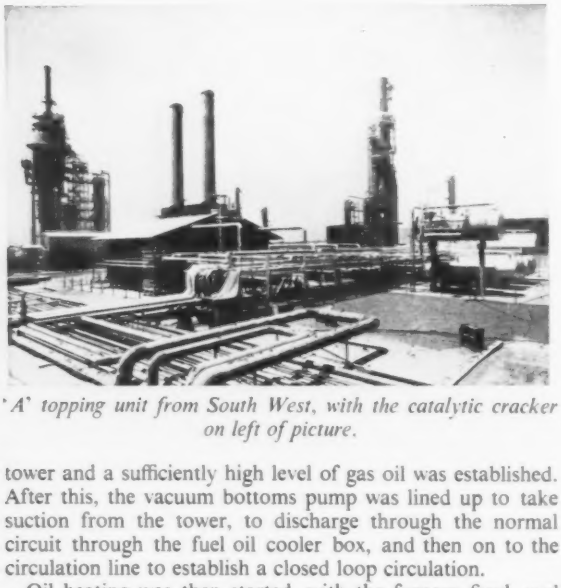
In each of the two crude distillation units the crude oil charge was separated into various fractions and the gasoline, heavy naphtha, and kerosine fractions were washed with caustic solution in single-stage wash systems to remove hydrogen sulphide. The gasoline stream was further processed for the removal of mercaptan sulphur by contact with an alkaline solution. This alkaline solution contained a

Platformer area from South East.

solubility promotor in a three-stage extraction system. The stream was then stabilized with the removal of light ends in the debutanizer tower.

The vacuum distillation unit in the refinery was designed to process a 24,000 b.s.d. charge of reduced crude from the No. 1 and No. 2 crude units, for the production of gas oils for cat cracker storage. There are two cases: one producing vacuum gas oil feed for a recycle operation of the catalytic cracker, and the other producing maximum wax distillate for a once-through operation. Vacuum tower bottoms are tar residue.

In the start-up of this unit, after usual tightness and vacuum tests, gas oil was first introduced and circulated to warm up the system. To do this, gas oil was brought to the vacuum



'A' topping unit from South West, with the catalytic cracker on left of picture.

tower and a sufficiently high level of gas oil was established. After this, the vacuum bottoms pump was lined up to take suction from the tower, to discharge through the normal circuit through the fuel oil cooler box, and then on to the circulation line to establish a closed loop circulation.

Oil heating was then started, with the furnace fired, and while the initial warming of gas oil was in progress, an operator was preparing and putting into service vacuum producing equipment. A vacuum was pulled on the system to draw air from vessels.

The injection of superheated steam to the furnace line transfer and to the stripping section was not begun until all temperatures in the flash zone reached approximately 225°F. With a partial vacuum on the tower, this temperature was appreciably over the condensation temperature of steam.

Firing was then regulated to raise the furnace outlet temperature at a continued rate of approximately 100°F per hour. As temperature conditions increased, there was an appreciable vaporization of hydrocarbons in the vacuum tower. This caused heavier portions of the ascending vapours to condense on the way to the top of the tower and fall back on the tray below. When a good level of distillate was visible in the heavy vacuum gas oil draw-off pan, a flow of intermediate reflux was started to the tower through the normal route to the vacuum tower's seventh tray. The flow recorder controller was set at a low rate at the start, and then gradually increased as the tower and temperature conditions indicated. During the "coming-on-stream", this minimized the possible entrainment of heavy material to the upper section of the tower upon the starting of reduced crude with the ensuing rapid vaporization of that material.

Reduced crude was then introduced. As the flow began in the unit, gas oil circulation was reduced correspondingly until elimination.

After this, valves were opened at individual coils of vacuum bottom coolers and vacuum bottoms were routed to storage.

Since the unit was now on reduced crude charge at elevated temperatures, the next adjustments were carried out to maintain a suitable balance between the reduced crude charge rate and the vacuum furnace outlet temperature—to prevent thermal decomposition. As the charge rate was increased, the outlet temperatures were increased.

When a temperature of approximately 725°F was reached, the crude charge rate was at least 80 per cent of the design rate. All reflux rates were increased accordingly. As furnace outlet temperatures approached their design value, some superheated steam—serving to lower partial pressure and aid vaporization—was introduced to the transfer line relatively close to the vacuum tower. As temperatures approached their anticipated design values, the intermediate reflux pump was started circulating back to tray No. 9 of the vacuum tower.

The Hydrofining Unit

By this stage of operation the hydrofining unit was ready to go into operation. In this unit, straight-run kerosine-gas oil mixtures containing high percentages of sulphur compounds are substantially desulphurized. This is achieved by contacting the oil with a stationary catalyst at high pressure and moderate temperature in the presence of a recycle gas stream, rich in hydrogen, supplied by the previously started platformer. Since the sulphur is eliminated as hydrogen sulphide, and since little or no hydrogen is produced, a net consumption of hydrogen occurs: consequently, a make-up gas stream, rich in hydrogen, must be continually fed to the system in order to keep the recycle gas stream from being depleted in hydrogen content.

In the process, the kerosine-gas oil mixture is pumped to above reaction pressure and preheated to some extent by exchange with the reactor effluent. It is then mixed with recycle and make-up gas and preheated to reaction temperature in a furnace. Reaction takes place with essentially no heat, although it is slightly exothermic, and supplies sufficient heat to counteract losses.

The gases and partially vaporized oil charge pass downward over a fixed bed of granular cobalt-molybdenate on alumina catalyst of predominantly $\frac{1}{8}$—$\frac{3}{8}$-inch size. Here the combined sulphur is converted substantially to hydrogen sulphide.

Gases and liquid from the reactor are then exchanged against liquid feed and cooled. The cooled mixture passes to a high pressure separator where recycle gas separates from the net product. The liquid from the separator is flashed at a lower pressure to eliminate a portion of the light gases, which may be sent to the fuel gas system or the flare. The liquid from the flashing step passes to the mid-point of a stabilizer, or stripper tower, through a feed-bottoms exchanger. Here the light gases and gasoline are fractionated out of the kerosine-gas oil mixture to produce an oil of specification flash point.

The kerosine-gas oil mixture is cooled and washed with caustic solution to remove any traces of hydrogen sulphide which may remain after the stripping operation. The vapour portion of the overhead from the stripper stabilizer tower, which contains 40 per cent hydrogen sulphide, is burned at a flare and the unstabilized gasoline fraction may be routed back to the crude topping unit. Regeneration facilities are also included in this unit.

Drying out of the furnaces was commenced and continued for three days before the loading of the catalyst. Following the charging of the catalyst and closure of the reactor, the unit was subjected to a high pressure air test on the high pressure side. Numerous leaks were made good and further vacuum testing was carried out before hydrogen was admitted to the unit. After the start-up of the platformer the unit was pressured with hydrogen and further leak testing carried out.

The low pressure system was purged with steam and pressured with refining gas. Gas oil was brought into the low pressure system and levels established in the stabilizer, feed stripper, etc.

A recycle gas flow was established at high pressure, furnaces fired, and warming of the reactor commenced. Oil circulation was then started on the high pressure side, by-passing the reactor. Furnace firing was increased and the reactor lined out at 700°F, at which time oil was cut into the reactor to put the unit on stream for its initial run.

The Catalytic Cracker

The Orthoflow fluid catalytic cracker in this refinery was designed to charge 12,500 b.s.d. of vacuum gas oil in single pass operation at 53·5 per cent conversion, or 10,000 b.s.d. at a throughput ratio of 1·3 and cracking to 62 per cent conversion. The expected yields include *fuel gas*, light gasoline containing sufficient butanes to have a Reid vapour pressure of about 9 p.s.i. and an end point of about 300°F; *heavy gasoline*, with an end point of about 410°F; re-run bottoms boiling between 400° and 500°F; stripped light gas oil, with an end point of 600°F; unstripped heavy gas oil, and decanted oil.

In starting up this unit, several steps were simultaneous, such as those for the convertor, fractionator, and gas recovery system. Certain operations of the convertor and fractionator, for example, must be co-ordinated and undertaken simultaneously because the two are open to each other through the unvalved reactor vapour line to the fractionator. For simplicity they will be described here as separate operations.

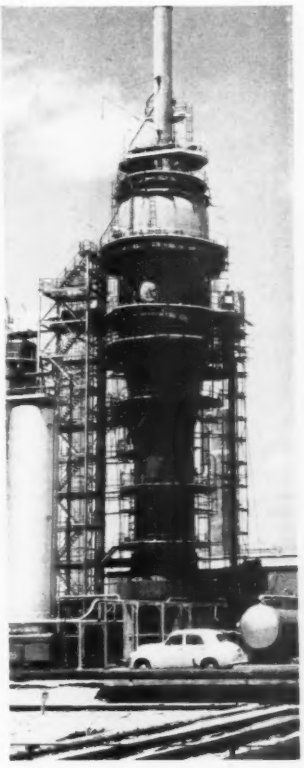
After preliminary steps and pressure testing, the air heater was fired and the regenerator temperature was raised to 950°F. During this regenerator heating, the reactor was heated to approximately 550°F. The regenerator was isolated and the reactor was purged with steam.

The gas compressor was put in service, circulating refinery fuel gas through the kick back line and back to the knock-out drum with a small gas make-up to the knock-out drum and a like amount releasing to the flare through a butterfly valve to maintain pressure on the system. The regenerator stack valve was throttled so that regenerator pressure was slightly higher than the reactor.

Catalyst charging of the regenerator was begun and once the regenerator standpipes were filled with catalyst and a pressure head was obtained across the plug valves, regenerator pressure was lowered and reactor pressure increased to prevent catalyst leakage past the plug valves and into the reactor.

The regenerator temperature was held at 600°F while charging catalyst and after charging was increased to 900°F with the air heater. Torch oil was then used, increasing the bed temperature to 1050°F.

Steam purging of the fractionator was begun with reactor purging. Steam flow to the fractionator system was temporarily reduced and when a full flow of steam issued from the overhead vent, the reactor was considered free of air. Then the overhead line was closed completely and the injection of reactor stripping steam was continued. Reactor temperature was held as high as 250°-300°F, with steam heating, and reactor effluent steam went to the fractionator.



Then catalyst was transferred to the reactor after regenerator temperature had reached approximately 1050°F. When sufficient catalyst had been added to the reactor to show a reading on the stripper, catalyst circulation was established. In these operations catalyst flow was started simultaneously from the regenerator bed to the reactor through regenerated catalyst standpipes by use of relay loading stations. Circulation was started at a slow rate and maintained to obtain a 750°F catalyst bed in the reactor. The reactor temperature was gradually increased as the rate became established.

With the reactor bed at approximately 750°F and catalyst circulation established, a small flow of fractionator settler bottoms (slurry) was started to the reactor feed line. As the oil flow was established, some of the heavier components of the feed remained unstripped from the spent catalyst. These were consumed in the regenerator. After the torch oil rate was decreased to maintain regenerator temperature, the reactor bed temperature was increased to a normal 900°F.

Upon the introduction of slurry to the convertor, catalyst flows were smoother. The flow of fresh feed was then started to the reactor. As the feed rate was increased and more coke was produced, it was necessary to reduce the quantity of torch oil until discontinuing its use. Normal spray water was used sparingly as regenerator top temperature reached 1050°F.

The reactor stripping steam flow rates were adjusted to effect good stripping of the spent catalyst.

The fractionator was started up after the usual purge and pressure testing; then it was opened to the gas system, as previously described, and oil circulation was established. As heating increased and distillation progressed the side-stream strippers were put in service and the products diverted to the recovery system or to storage. The gas make-up to the reflux drum was discontinued and the normal gas-make diverted from the flare to the recovery system to put the unit on-stream.

Extended Use of Oil

More Power Stations to be Oil-fired

"By 1960 we can see our way to the use of oil on a scale equivalent to an extra 25 million tons of coal a year". This impressive estimate of the part which oil is to play in meeting future U.K. energy demands was made by the Minister of Fuel and Power on 20 July when the Annual Report and Statement of Accounts of the National Coal Board were under discussion in Parliament.

Mr Geoffrey Lloyd opened by saying that his own wartime experience had taught him the immense flexibility and the enormous productive power of the oil industry and that he had long been convinced that only oil could bring quick help on a really massive scale to the coal industry and our fuel position. Unfortunately, nothing could be done along those lines until the Abadan settlement. The companies had done a magnificent job in making up for the lost oil, but there was not very much to spare. The Persian settlement, however, transformed the situation. Then, if anything, the danger would be too much rather than too little crude oil. But there remained the important question of the relative cost of coal and oil.

An increase in the price of coal in May, 1954, and the readiness of one large oil company to quote specially low rates for large quantities of oil delivered by water, meant, however, that for the first time in the U.K. oil became competitive with coal for steam raising on a large scale. The contract was signed and oil would begin to be used towards the end of 1955. By 1960 the equivalent of over four million tons of coal would be used.

A second contract with another oil company had been signed that day for a further three million tons of oil, which meant that in 1960 the Central Electricity Authority would be using oil to the equivalent of about nine million tons of coal a year.

In addition, more than a million tons of coal would be saved by the gas industry by the use of oil in making town gas.

Mr Lloyd then referred to the rise which had also taken place in the use of oil for heating and for steam raising in general industry. Even before the last increase in the price of coal, said Mr Lloyd, many big firms were considering changing to oil.

Estimating that the use of oil in 1960 would be on a scale equivalent to an extra 25 million tons of coal a year, Mr Lloyd said that this was a really substantial figure. Moreover there were still further possibilities, because low-flash fuel oil and even crude oil were being successfully used, and of these the supply was virtually unlimited.

Shell-Mex and B.P. Agreement

On the same day as the Minister gave this survey of the fuel position with regard to oil, an agreement (to which the Minister referred) was signed by Lord Citrine, Chairman of the Central Electricity Authority, and C. M. Vignoles, managing director of Shell-Mex and B.P. Ltd, covering terms for the supply of oil fuel to the Central Electricity Authority for 12 years from 1955 and with provision for extension thereafter at the will of both parties.

This contract extends the use of oil fuel, which had already been initiated in co-operation between the Central Electricity Authority and Shell-Mex and B.P. Ltd. at Bankside power station in London at the time of the construction of the station in 1952, to seven further stations, namely Ince, Bromborough, Cliff Quay (Ipswich), Carrington (Manchester), South Denes, (Great Yarmouth), Belvedere, and a projected new station on the Thames estuary. A maximum eventual consumption of three million tons per annum of oil fuel is allowed for under this contract. This is expected to allow a saving of coal to the Central Electricity Authority of nearly five million tons per annum within a few years. The price of oil fuel under this contract is appropriate to the large quantity involved and is related to and will move with movements of the market price for fuel oil. A novel feature of this contract is that it provides for the use at two of the stations selected of low-flash-point fuel oil. This will help to ease difficulties of refinery balance and provide greater flexibility at the refineries.

Signing the new Esso/C.E.A. contract; (left to right) *R. J. Pinder (Director, Esso Petroleum Co. Ltd.), Sir Leonard Sinclair (Chairman and Managing Director, Esso Petroleum Co. Ltd.), Lord Citrine (Chairman, Central Electricity Authority), J. Eccles (Deputy Chairman, C.E.A.), and A. G. E. Farquhar (Deputy Secretary, C. E. A.).*

Esso Agreement

Since 1954 Esso Petroleum Co. Ltd. has been under contract to supply the oil needs of Marchwood power station, and on 23 June a new contract was signed by Sir Leonard Sinclair, Chairman of Esso Petroleum Co. Ltd., and Lord Citrine, Chairman of the Central Electricity Authority, for the supply of fuel oil to seven more electrical power stations.

These two contracts together will mean that a total of approximately 30 million tons of fuel oil will be supplied by Esso to the C.E.A. over a full ten-year period. The oil supplied will be equivalent to between four and five million tons of coal each year.

Facilities at Esso's Fawley refinery are to be extended to provide this huge volume of oil. Greatly increased storage tank capacity will be necessary and a substantial extension of ship berthing accommodation. Considerable expansion in the Company's ocean-going and coastal fleets will also be required.

Around the Branches

BAHRAIN, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH EASTERN, SOUTH WALES, STANLOW, TRINIDAD

Bahrain Branch

An extraordinary general meeting of the Bahrain Branch of the Institute of Petroleum was held at Awali, Bahrain, on Monday, 6 June to consider amendments to the proposed rules for the Branch. The changes, which had been recommended by the Branches Committee of the Institute, were approved at the meeting and the revised rules have been forwarded to London for final approval.

This meeting was followed by the fourth ordinary meeting, which consisted of two talks on "Off-shore Drilling Equipment". Over 50 members and guests attended.

The first speaker was P. A. F. de la Calle, manager of the Shell Oil Company at Doha, Qatar, who gave an excellent talk on the movable platform now in use for exploratory drilling off the coast of Qatar. Mr de la Calle explained that an extensive survey of the proposed drilling sites showed that it would not be possible to drive piling for a platform because of the hardness of the sea-bed. Also, as the location was exposed to the full sweep of the Gulf, with its frequent storms, it was considered that it would not be suitable for a drilling barge. For these reasons it was decided to use a movable platform. Mr de la Calle stated that the drilling platform at Qatar, which is 150 by 90 feet and is supported by 8 legs, is capable of withstanding winds of 80 to 90 miles an hour and waves about 20 ft high. It was designed and assembled in Holland and then shipped in sections to Umm Said, Qatar, and reassembled at Doha on two barges. With the aid of diagrams he then gave an outline of the construction of the platform and explained the method used in positioning it. He also mentioned that the platform was now being modified to provide a landing space for a helicopter and the legs lengthened for drilling in deeper water. After a discussion period, a film was shown which had been taken when the platform was being moved to the drilling site last October.

After a short intermission, the Chairman, W. H. Cotter, then introduced the second speaker, D. O. Nelson of the Arabian American Oil Company. Mr Nelson gave an interesting talk on the barge *Queen Mary* which is used by Aramco for drilling the off-shore wells of the Safaniya field. This barge, which is over 170 feet long, was originally built for the Creole Petroleum Corporation for drilling wells in Lake Maracaibo. However, three years ago it was purchased by Aramco and towed to the Gulf. Mr Nelson gave a detailed description of the barge and enumerated its special features, such as push button controls. The basic simplicity of the design, which had enabled the barge to be operated with a minimum of "down time", was also emphasized. After Mr Nelson had answered a number of questions, R. E. de Mestre proposed a vote of thanks to both speakers for their interesting talks.

New Officers

The following officers have been elected for the year 1955-6: Chairman, W. H. Cotter; Secretary, R. B. Bennett; Treasurer, G. B. Thompson. Members of Committee are H. Catlow, P. Clark. S. B. Ford, G. P. Gilbert and R. E. de Mestre.

A South-Eastern Branch party arrives for a tour of Shell Haven refinery.

London Branch

On 17 May the Branch held its annual Forum and a panel consisting of P. Gibson, S. E. Holmes, R. F. Leach, and E. H. Wilde, with A. E. Mauchan as question master. dealt with a wide variety of questions.

The audience was invited to express its opinion of the answers given by the panel, an innovation which helped to make this one of the Branch's most enjoyable and entertaining meetings.

Questions discussed included "who was and is the most outstanding figure in petroleum history?" Although Colonel Drake and Rockefeller were inevitably mentioned the panel felt that Henry Ford had excellent qualifications.

A most interesting discussion arose out of a question on diesel-engined cars and whether it was considered that the advantages in fuel economy compensated for the increase in cost, weight, and vibration of a diesel as compared with a petrol engine. Light relief and humour were provided in the answer to the enquiry whether the British working man is incapable of being trained to give the type of gasoline station forecourt service which is demanded by motorists in the U.S.A.

Almost every member of the audience contributed to the discussion—a sure sign of the popularity of the meeting and the efficiency of the panel in injecting controversy into their answers.

South-Eastern Branch

Three interesting visits were arranged for members of the Branch and their friends during June and July.

On 11 June a party of 28 paid a visit to the Maidstone brewery of Fremlins Ltd. where the whole process of production was followed through from malt storage rooms to bottling and despatch.

A visit to Shell Haven refinery followed on 2 July during which members heard something of the history of the refinery area and made a comprehensive tour of the units in operation.

Members of the South-Eastern Branch pictured during their visit to a Maidstone brewery.

Dr Carruthers.

The third of these summer visits was to three London newspaper printing works where 24 members of the Branch watched all the phases of daily newspaper production.

New Chairman

J. E. Carruthers, B.A., B.Sc., Ph.D., D.I.C., F.Inst.Pet., is to take the chair of the South-Eastern Branch this Autumn. Dr Carruthers is a native of Whitehaven, Cumberland. He was a Scholar of Emmanuel College, Cambridge, where he took a Ph.D. as a result of research into the kinetics of gas reactions. As a Beit Scientific Research Fellow at Imperial College, London, he worked with the late Professor Bone on the combustion of hydrocarbons.

Joining the oil industry in 1938 with the then Anglo-Iranian Oil Co. Ltd., he spent a short time at the Sunbury Research Station before he was transferred to Iran where he had experience in the oilfields' centre of Masjid-i-Suleiman, and refinery experience in Abadan. His period in Abadan coincided with the vast wartime increase in aviation spirit output, and he was concerned with the expansion of facilities for production of aviation alkylate and isomerization of butane.

From 1948-50 he was chief chemist in Abadan and joined the works management in 1951. After the withdrawal of the Anglo-Iranian Oil Company from Iran, he was appointed technical superintendent of Kent Oil refinery, a position which he now holds.

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Personal Notes

R. J. Glinn, M.I.Mech.E., has retired after 44 years with Babcock & Wilcox Ltd. He has also retired from the Board of the Calorizing Corporation, of which he has been a Director since 1928.

Mr Glinn first joined Babcock & Wilcox as a student apprentice at Renfrew in 1911. After serving in the first world war he returned to Babcock & Wilcox and remained there until his retirement. During these years he was responsible for much pioneering work on oil firing, pulverized fuel, and the development of automatic soot-blowers. From 1926 onwards he was in charge of investigations into the effects of impurity in feed water, and he is a recognized authority on the phenomena of caustic cracking in steam boilers.

A. W. Hanson, has been appointed manager of the Newcastle office of Babcock & Wilcox Ltd. Mr Hanson was until recently manager of the Karachi office of the Company, which he opened in 1949. **P. R. Bettle** is to be his deputy at the Newcastle office.

L. J. Lester, A.M.Inst.Pet., formerly with W. Arthur Brown and Co. Ltd., has now taken up an appointment with Maxima Lubricants Ltd.

C. Howard has been appointed Engineer Commodore of The British Petroleum Company's British Tanker Company fleet. Mr Howard joined the British Tanker Company in 1922 and in 1952 was appointed one of the Company's Senior Post Chief Engineers. He is at present serving in m.v. *British Guide*.

W. Rutherford, Chief Ship Manager of the British Tanker Company, has retired after 33 years' service with the Company.

The Minister of Fuel and Power has appointed **Professor W. R. Hawthorne,** M.A., to be a member of his Scientific Advisory Council. The Council was set up in 1948 to advise the Minister on the scientific aspect of his statutory duties.

Professor Hawthorne is Chairman of the Fuel Research Board of the Department of Scientific and Industrial Research, and has been Professor of Applied Thermodynamics at the University of Cambridge since 1951.

C. S. Hadfield has been appointed Treasurer of The Shell Petroleum and Anglo-Saxon Petroleum Companies, and **J. G. van den Bosch** has been appointed Deputy Treasurer of these Companies.

G. B. Huiskamp is taking up an appointment with the Royal Dutch/Shell Group at The Hague.

W. E. Gooday who retired recently from his position with New Consolidated Gold Fields Ltd., has been appointed Secretary of the European Section, Directorate of Recruiting, Transvaal and Orange Free State Chamber of Mines. His office address is Terminal House, Grosvenor Gardens, S.W.1.

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VACUUM OIL CO. CHANGES

Vacuum Oil Co. Ltd. has now formed a new industrial division in South Wales to meet the growth of the Company's business in South and West Wales. The Division's headquarters are at Cardiff and the divisional manager is **A. Peck.**

A new automotive division has also been formed. This has its headquarters in Bristol and will cover the western area of Great Britain. **G. Bryce Cousens,** formerly general manager, Vacuum Oil Co. (Ireland) Ltd., has been appointed manager of the Western Automotive Division. **M. E. Morgan** is now district manager (Automotive) at Cardiff, and **J. H. Berry** is office manager of the new division.

G. A. Dickins, B.Sc., F.Inst.Pet., has been appointed assistant manager of the Technical Department at the Company's Headquarters in London. Mr Dickins was formerly superintendent of the Company's Central Laboratories at Wandsworth, S.W.18.

V. H. Rumble, B.Sc., has been appointed superintendent of the Wandsworth Central Laboratories and will also continue to direct the activities of the Products Division. **F. J. Patman** and **P. E. B. Vaile** have been appointed assistant supervisors of the Products Division.

T. Paterson, formerly supervisor of the Lubricant and Allied Products Section, Central Laboratories, has been transferred to the headquarters office where he will be responsible for matters concerning greases, patents, and industrial hazards.

Cathodic Protection for Kwinana Jetty

By **K. A. Spencer***

Introduction

The soil upon which the Kwinana refinery has been erected is almost entirely siliceous sand with a small percentage of limestone dust and it contains practically no soluble salts. The average electrical resistivity of the soil to buried pipe depths is greater than 100,000 ohm cm, indicating that the soil is virtually non-corrosive. The choice of the refinery site is ideal from the anti-corrosion aspect and renders unnecessary the application of cathodic protection to the buried pipelines and tank bottoms.

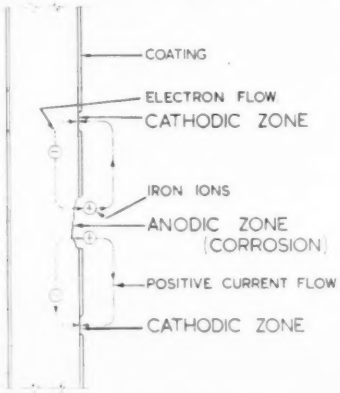


Fig 1a. *Simplified corrosion mechanism.*

However, a large oil refinery requires marine structures and it is universally appreciated that sea water is very corrosive to steel. Above the low water mark it is possible to protect such structures as steel piling by periodic maintenance with protective coatings, but this method cannot be adopted for steel permanently submerged. The development of cathodic protection methods now makes it possible to ensure complete protection for the steel in this zone.

As illustrated in Figure 1a, the corrosion of submerged metal is always associated with a natural flow of direct electrical current from the metal to the electrolyte, in this case sea water. When cathodic protection is applied to the submerged sections of a steel structure, as shown in Figure 1b, direct electrical current from an external source is made to enter the metal from the electrolyte and thus metal ions cannot leave the steel and pass into solution. The corrosion is thus transferred from the structure to anodes, which may be readily replaced. By selection of inert anode materials such as graphite the groundbeds can be so designed that they have an infinitely long life.

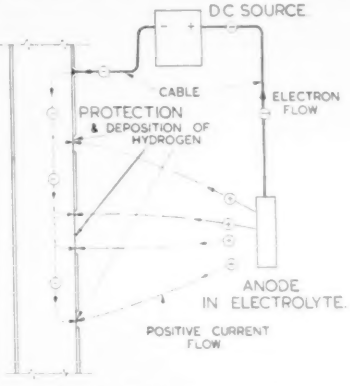


Fig 1b. *Cathodic protection.*

It is not possible in this short article to discuss in detail the application of cathodic protection, but it must be stated that to ensure protection the metal must be held sufficiently electro-negative at the metal-electrolyte interface to prevent positively charged metal ions leaving the metal surface. In order to obtain the protection outlined above, the metal-sea potential is depressed, and a value of $-0{\cdot}85$ to $-0{\cdot}95$V relative to a copper copper-sulphate half-cell is regarded as the ideal.

It will be appreciated that the amount of current necessary to obtain the required potential depression is proportional to the area of bare metal exposed to the sea water electrolyte. For this reason the corrosion engineer aims at having the best possible coating available at economic cost, together with cathodic protection to cover the faults in the coating which may exist initially, or develop later due to marine animal attack etc. Coatings alone are inadequate, but they reduce the power required for cathodic protection by protecting large areas of metal, and there is obviously an economic balance between the money to be expended on coating and on cathodic protection.

It is the author's experience that cold applied coatings, which harden by evaporation of diluents leaving a protective layer only a few thousandths of an inch thick, are unsatisfactory for steel structures, such as piling, which must remain permanently submerged. The most satisfactory results have been obtained on steel which has been sand-blasted or at least well cleaned, suitably cold primed and, when this is dry, coated with a coal tar base or asphaltic base enamel applied hot. For marine applications where the coating cannot be maintained by manual repair, bitumen of $\frac{3}{32}$—$\frac{1}{8}$-inch thickness, closely adherent to the metal, is strongly advocated.

Fig 2. *Underneath the jetty approach section.*

The Larssen sheet piles of the Kwinana refinery water intake flume were coated over their full length, and the box piles of the jetty to within 10 feet of the bottom, with asphaltic base bitumen enamel applied hot. Although experiment shows that best results are obtained with the piles completely coated, this was not possible in the case of the jetty piles for civil engineering reasons. In spite of the extra bare metal, complete protection was achieved without increasing the installed current capacity and this can be attributed to the excellence of the coating on the piles where it was applied.

*Consulting Engineer.

Protection of the Jetty

The jetty is constructed of asphaltic-enamel-coated steel box piles with concrete muffs, on which rest reinforced concrete beams with precast reinforced concrete decking with an adjacent piperack.

In order to effect cathodic protection of the steel piles it was necessary to ensure that they were electrically continuous with one another, and this was achieved by bonding with $1\frac{1}{8}$-inch diameter steel bar, bitumen-primed and wrapped with an adhesive P.V.C. tape. The bonding of the piles was designed in co-operation with the consulting engineers for the jetty, Messrs Rendel, Palmer, & Tritton. The pleasing appearance of the structure has not been adversely affected by the bonding. Figure 2 provides a view along the underside of the jetty approach section and Figure 3 shows an expansion loop in the bonding rod where the approach section joins the main jetty trunkway.

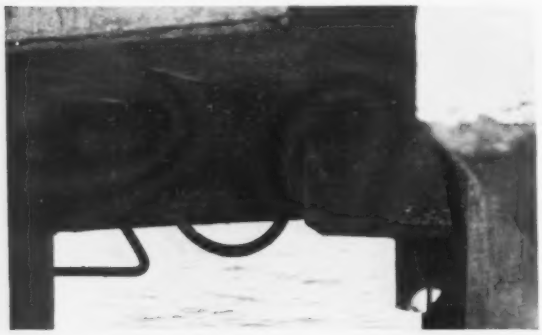


Fig 3. *Expansion loop in the jetty bonding system.*

Cathodic protection is supplied by direct current flowing from three graphite anode groundbeds located in the foreshore, as shown in the general layout (Figure 4).

Each groundbed consists of graphite anodes embedded in alkaline carbonaceous backfill and is supplied by a transformer rectifier.

Positive direct current flows from the graphite anodes through soil and water to any bare metal on the jetty piles and returns through the pile bonding to the common negative terminal busbar of the transformer rectifiers. The electrical equipment is located in a building adjacent to the jetty approach.

The jetty and associated mooring dolphins were brought to protective level by a total A.C. power input of 12 kVA. This power consumption will be reduced in a few months time when calcareous deposits have been built up on any exposed submerged metal.

To meet the requirements of Rule 204 of the I.P. Electrical Code, cables with special bonding clamps have been provided, and these allow tankers to be electrically bonded at each of the jetty heads via a flameproof switch. The bond is made before hoses are connected to the tanker and is broken only when the hoses have been removed. This system, designed to meet static electricity safety regulations, is also suitable for a jetty under cathodic protection.

Water Intake Flume Protection

The refinery water intake flume consists basically of three parallel lines of Larssen sheet piling extended some 780 feet out to sea, as shown in Figures 4 and 5. It is 13 ft wide and the roadway 28 ft wide, and the sheet piling is coated with asphaltic enamel applied hot.

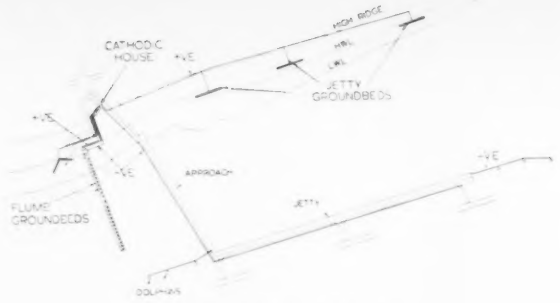


Fig 4. *General layout of the scheme.*

The sheet piling is protected cathodically by three transformer rectifiers supplying three separate groundbeds; the total power input to these units is 7 kVA. The first groundbed, inside the flume itself, consists of graphite anodes resting horizontally on the floor of the flume and maintained in position by concrete blocks. The graphite anodes of the second groundbed are installed vertically, packed with carbonaceous backfill, in lengths of 16-inch diameter pipe along the centre line of the flume roadway. The third groundbed, primarily serving the exterior surface of the flume piling, is located at low water mark to the north of the flume, as shown in Figure 4.

Conclusion

The advent of cathodic protection has offered the opportunity of protecting buried submerged metal against corrosion in an economic and efficient manner, and The British Petroleum Co. Ltd., in this case through their associate Australasian Petroleum Refinery Ltd., have adopted it for their marine structures.

A cathodic protection system of the type installed at the Kwinana refinery is capable of operating for many years with virtually no maintenance other than occasional inspection so that slight adjustments may be made.

Fig 5. *View along water intake flume from seaward end.*

ISO Technical Committee 28 on Petroleum Products Meets

Agreement and Discussions on International Standards

The second meeting of the Petroleum Products Technical Committee No. 28 of the International Organization for Standardization (ISO) took place in London on 23 and 24 June at the headquarters of the British Standards Institution.

The scope of the Committee's work, as agreed during its first meeting in New York in June 1951, is intended to cover "methods of measurement, methods of sampling, methods of test, nomenclature, terminology, and specifications for petroleum and petroleum products."

TC 28 consists of 15 "Participating Members" and 16 "Observer Members", the U.K. being represented by the BSI as the national standards organization of the U.K.

The U.K. delegation at this second meeting of the Committee totalled thirteen, including strong representation from the oil industry. The delegates were: Lt.-Col. S. J. M. Auld, Chairman of the meeting; H. Hyams (The Shell Petroleum Co. Ltd.) Leader of the delegation; G. Claxton (National Benzole Co. Ltd.); Dr D. Clayton (Imperial Chemical Industries Ltd.); Dr E. B. Evans (Esso Development Co. Ltd.); F. L. Garton (The Shell Petroleum Co. Ltd.); A. J. Goodfellow (Carless, Capel, and Leonard Ltd.); R. P. Langston (Ministry of Supply); Dr F. B. Thole (Ministry of Fuel and Power); W. H. Thomas (The British Petroleum Co. Ltd.); E. J. Widdowson (The Admiralty); A. T. Wilford (London Transport Executive); and C. S. Windebank (Esso Development Co. Ltd.).

IP Members of the British delegation at one of the sessions of ISO TC No. 28: (left to right) E. J. Widdowson, W. H. Thomas, F. L. Garton, C. S. Windebank, Dr E. B. Evans

Ten countries were represented at the meeting—Belgium, Denmark, France, India, Italy, Japan, Netherlands, Sweden, United Kingdom, and United States.

The following is a summary of the work which was carried out at this meeting.

(i) It was agreed to submit the ASTM/IP Petroleum Measurement Tables and the ASTM motor and research knock rating methods for motor fuel to ISO headquarters as international recommendations. The IP versions of both these projects are either identical with or technically equivalent to the ASTM counterparts.

(ii) A vocabulary of terms in French and English submitted by France and covering the petroleum and allied industries was referred for further study to a working group comprised of representatives from France, Belgium, India, U.K., and U.S.A.

(iii) Data had been compiled on the viscosity methods used and the viscosity temperatures favoured in 17 member countries of the Committee. It was considered that this information was of value to each member.

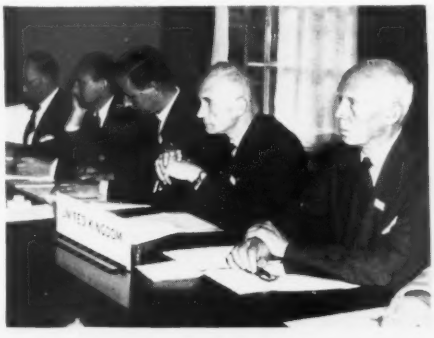
Chairman of the ISO TC No. 28 meeting was Col. S. J. M. Auld, seen here with H. T. Lawrence (B.S.I.) on the left and W. T. Gunn (ASTM Committee D-2).

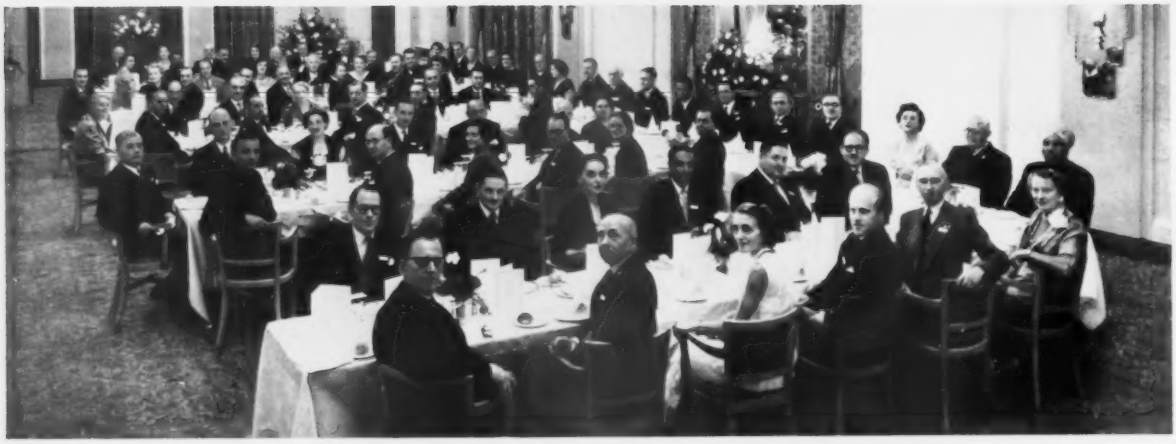
(iv) A programme of future work was agreed as follows:

(*a*) Recommended methods for determination of specific gravity and density.
(*b*) Determination of kinematic viscosity in absolute units.
(*c*) Sampling of petroleum products.
(*d*) Absolute (dynamic) viscosity.
(*e*) Methods for determination of flashpoints of mineral oils.
(*f*) An attempt to agree an ASTM/IP method for determination of tetraethyl lead in gasoline, for international consideration.
(*g*) The compilation of data on physical properties of petroleum hydrocarbons, also for international consideration.

An invitation from France to hold the next meeting in Paris in about two years time was warmly accepted.

H. Hyams, R. P. Langston, A. J. Goodfellow, A. T. Wilford, and Dr F. B. Thole.





Guests at the BSI IP dinner which followed the meeting of ISO Technical Committee No. 28.

BSI IP Dinner to ISO Delegates

A highly successful dinner, in association with the above meeting, was held on 23 June at the Park Lane Hotel when the BSI and IP acted as joint hosts. Sir Roger Duncalfe, the President of BSI, who, together with Lt.-Col. Auld had received the guests, was in the Chair for the dinner. He proposed the toast of the Petroleum Industry, the response to which was made by M. Orsal, the managing director of the French Union des Chambres Syndicales de l'Industrie du Pétrole, who had flown over specially to attend the dinner.

In the course of his speech, Sir Roger Duncalfe referred to the remarkable fact that his own life-time more than covered the span of the petroleum industry's meteoric progress from small beginnings to its present gigantic size and power. "How one's imagination boggles", Sir Roger commented, "at this 'black magic' lying in the deep caverns and rocks far down in the earth's crust waiting for all those years to be brought up and converted to 'white magic' for the service of mankind. What other industry can contemplate a pipeline stretching 4000 miles across a continent from shore to shore linking the Pacific with the Atlantic?"

Turning to the Committee's work on standardization, Sir Roger expressed the belief that international standards could confer great benefits on mankind, could lead to a smoother interchange of trade in an expanding world economy, and could assist in promoting friendship and understanding amongst the nations as well as a higher living standard for our peoples.

Sir Roger went on to speak of the future of the petroleum industry, and said that there could be little doubt that along the way ahead lay much adventure and a scope as unlimited as in the past.

Finally, Sir Roger said, "I must comment briefly on the great amount of most valuable work connected with standards in this country which has already been evolved by the Institute of Petroleum. This great body, whose President we are proud to have with us this evening, has produced in its publication "Standard Methods for Testing Petroleum and its Products" real and valuable contributions to the usefulness of test methods and procedures. These gain in importance because of the very close liaison which exists between the Institute of Petroleum and corresponding organizations in other countries such as the ASTM.

"As President of the British Standards Institution, I cannot say too warmly how pleased we have been to see within the last few years the development of even closer ties between the Institute of Petroleum and the BSI in connexion with the evolution of standard methods of testing petroleum products. This close association has greatly helped the contribution which my country has been able to make towards the work of the ISO Committee, so that we have been able to express a completely united viewpoint in that committee's deliberations."

Replying to the toast, M. Orsal said how proud he was to express the thanks of all present to Sir Roger Duncalfe and Colonel Auld for their warm reception and to congratulate them on the perfect organization of the work of this meeting.

Sir Roger had traced the extremely brilliant career of their young industry, said M. Orsal, and they were indeed proud of the magnificent results which it had achieved, of its dynamic character, and of its future prospects of expansion. Above all, however, they were proud of the spirit of co-operation which existed in the industry. Collaboration—working hard to find common solutions—was more than ever a vital necessity—both in personal contacts and in international affairs, and it was surely true to say that a spirit of collaboration lay behind all programmes of standardization.

It was said in France, said M. Orsal, that standardization involved specification, unification, and simplification.

Specification consisted of defining the products which one proposed to standardize, establishing methods of test, analysis, and control, and laying down a terminology and a common language.

Unification lay in agreeing upon bases which were sufficiently interchangeable to allow large scale production and thus lower cost prices.

Simplification necessitated the abandonment of old methods, and the rejection of designs which were out-of-date or over-numerous.

Some people had feared that standardization would submit the economy to too great a constraint and would stand in the way of progress, initiative, good workmanship, and the free expression of art or genius.

In fact, far from limiting the inventive and creative spirit, the general rules which standardization had laid down had resulted in efficient collaboration and had adapted themselves to development.

M. Orsal then went on to refer to the intensive research which had been carried out for many years in America, the United Kingdom, and the majority of European countries, in petroleum technology.

An attempt had been made in Europe to compare the different methods adopted and to find some common standards. This had, however, proved very difficult. Apart

from questions of petroleum technology itself, there was not only the problem of specifications for manufacturing materials but also the question of different systems of measurement. One came up against the old rivalry between the "inch", dear to Anglo-Saxon nations, and the "metre", adopted by the Europeans. In the interests of standardization as a whole it was infinitely desirable that this rivalry should be removed.

On an international plane, however, the attempt to work together represented by ISO/TC 28 was progressing favourably under the very competent guidance of its Secretary General, Mr Gunn.

The meetings of the Committee in New York in 1952 and in London in 1955 had marked two important stages in its work. At the end of this meeting members would return to their studies and research cheered by the results which had come from their two days' deliberations.

"The Overseas Guests"

A toast to "the Overseas Guests" was then proposed by Lt.-Col. S. J. M. Auld who expressed the sincere hope that all the guests would enjoy the evening and their whole stay in London. In particular, he extended a hearty welcome to the lady guests both home and from overseas.

Col. Auld then went on to express his particular pleasure in listening to M. Orsal's "statesman-like" speech and in having present Mr W. T. Gunn of the American Petroleum Institute, and Vice-Admiral G. F. Hussey, managing director of the American Standards Association.

Replying to the toast, Vice-Admiral Hussey said, on behalf of all those from overseas, how keenly they appreciated the hospitality which had been extended to them throughout their visit and the facilities which had been placed at their disposal by the director of BSI.

Col. Auld with Sir Roger and Lady Duncalfe at the reception held in connexion with the meeting.

In the seven years during which he had observed ISO operations at close range he had been impressed, said Vice-Admiral Hussey, by several things, especially by the rate of progress and by the manner of presentation of the various national viewpoints. The delegates from the several standards bodies came to the Technical Committee meetings to urge strongly their own national viewpoints, and then with their peers they reached technical compromises which each could take home and defend as sound technical decisions.

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Iraq Oil in 1954

In a colourfully and originally produced booklet, "Iraq Oil in 1954", the Iraq Petroleum Company surveys the progress made during 1954 both in production of oil and in exploration to ensure future development.

During the year output was increased by each of the three Companies, the Iraq Petroleum Company, the Basrah Petroleum Company, and the Mosul Petroleum Company, their total production rising to 29·6 million tons.

Production from the Kirkuk field in 1954 was 23,719,672 tons, leading to a cumulative total for this field of 130 million tons. Only 11 other oilfields in the world have produced over 100 million tons.

Production by the Basrah Petroleum Company was 4,584,358 tons and there was a steady expansion of installations in preparation for a throughput of crude oil at the rate of 8,000,000 tons per annum by the end of 1955. An important feature of the year's work was the development of the Rumaila field and the laying of 20 miles of 12-inch pipe to link Rumaila with Zubair.

Production by the Mosul Petroleum Company totalled 1,281,827 tons during the year. Two out of three new wells completed at Butmah were producers but a high rate of pressure decline in these wells and in the Ain Zalah first pay producers, and the appearance of water with oil in Ain Zalah second pay producers, led to serious anxiety. Preparations were therefore made for installing gas lift in Butmah producers, using Ain Zalah gas.

The greater part of this year's report deals with the intensive programme of exploration which was put into operation during 1954 in all three concession areas. The reasons for this programme and its results are summarized in the following words by H. S. Gibson, managing director of IPC, in a foreword to the brochure:

"The high level of production from Kirkuk, the high rate of pressure decline at Zubair, and the still more serious production difficulties at Ain Zalah and Butmah, make it urgently necessary to discover new reserves to supplement these producing fields, and in 1954 the exploratory efforts of the three Companies were intensified. In the IPC concession these efforts have been crowned with success at Jambur and Bai Hassan, and in the Basrah concession by the discovery of the Rumaila field. Unfortunately, in the Mosul concession, where over 100 test wells have been drilled, no structure comparable with the producing fields of central and southern Iraq has yet been found. But the search, using all the resources of geology and geophysics, and an intensive programme of drilling, is being vigorously pursued."

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BICERA

At the recent Annual General Meeting of The British Internal Combustion Engine Research Association the Rt. Hon. the Viscount Falmouth was re-elected President. Sir Harold Roxbee Cox, Dr S. F. Dorey, Chief Engineer Surveyor, Lloyd's Register of Shipping, and Vice-Admiral Sir Frank Mason, Engineer-in-Chief of the Fleet, were re-elected Vice-Presidents. Brigadier H. P. Drayson, Director, Royal Engineer Equipment, Ministry of Supply, was elected a Vice President. V. H. Hopkins and A. C. Yeates were elected to the Council. J. Calderwood has been elected by the Council as Chairman.

CBMPE Report 1954-5

Members of the Council of British Manufacturers of Petroleum Equipment who attended the Council's Annual General Meeting on 20 July, 1955, heard Mr Douglas Wilson (retiring chairman) speak in optimistic terms of the future of both the industry and the Council. "It seems", said Mr Wilson, "the industry is running at something like £100 million a year—and that is no mean sum. We have every reason to believe that the figure will not only be maintained but is likely to increase."

Mr Wilson continued "I am vacating the Chair not only with increased faith in the future of this great industry, but also with a firm belief in the growing influence of the Council.

The Annual General Meeting of CBMPE was followed by a cocktail party at the Café Royal. Seen here are Mr Douglas Wilson and Mr and Mrs G. V. Sims who welcomed guests to the party.

Achievements bring with them certain responsibilities, not only collectively, but also individually. Chief amongst these is the realization of the universal nature of the oil industry, and its influence on world economy. That the Council and its members will play a very significant part, I have no doubt whatever."

The new Chairman of the Council, as from 1 August, is G. V. Sims, managing director of Le Grand Sutcliff & Gell Ltd.

In the Chairman's Report of the Work of the Council, 1954-5, Mr Wilson refers to a facet of oil company activity to which the Council's Technical Adviser had been drawing special attention during the period under review—the increasing importance of maintenance and repair servicing of refineries. Now that the construction stage of the post-war development programme by British oil companies had largely been completed, periodical shut-downs had come into prominence as well as normal engineering maintenance.

Members must fully realize the importance of this matter and its implications to manufacturers. If the total sum currently invested in British-owned refineries at home and overseas were estimated at some £250 million, the annual expenditure on maintenance and repair might be taken as some £6¼ million, taking into account wear and tear and corrosion but not including obsolescence. This sum did not include modernization or expansion.

It was clear that manufacturers must expect a considerable call on their capacity in this connexion. They must be able and ready to deal with it efficiently, regarding it as bound up with after-sales service where British equipment had been supplied in the first place and as an opportunity for British enterprise where this had not been the case. The Executive Committee of the Council believed, therefore, that it was most important that every manufacturer should recognize the magnitude of this problem and should give factual consideration to whether his own organization was able to meet its demands, whether for work on site or in his factory, whether called for by oil companies themselves or by contractors. For its part the Council would make every effort to get as much information as possible about the oil companies' plans, so far as these matters could be planned in advance, and to study the stores and maintenance facilities at their disposal.

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HIGHER TECHNOLOGY COURSES

The Regional Advisory Council for Higher Technological Education has recently issued its Bulletin for the Autumn term of special courses in London and the Home Counties. The majority of the courses are part-time and over 30 educational establishments are covered. Subjects included range from accountancy to X-ray technology, and include such items as chemistry of waxes, chromatography, colorimetry, corrosion research, digital computers, liquid fuels, oil burners, technical report writing, etc.

Copies of the Bulletin, price 1*s.* 6*d.*, are obtainable from the secretary, Regional Advisory Council, Tavistock House South, Tavistock Square, London, W.C.1., who would also be glad to receive suggestions for further courses to meet special or local demands.

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Industrial Instrumentation

"Industrial Instrumentation and Automatic Process Control" is the title of a series of lectures and demonstrations to be given at Battersea Polytechnic during the coming session under the direction of Dr G. L. d'Ombrain, B.Sc. (Eng.), D.I.C., A.C.G.I., M.Am.I.E.E., M.I.E.E., Consultant and Head of the Department of Electrical Engineering at the Polytechnic.

The aim of the courses is to introduce engineers, physicists, chemists, and others who are interested, to the possibilities of automatic control.

Dr d'Ombrain will be assisted by experts from a number of companies engaged in the manufacture and use of industrial instruments.

Full details are available from the Electrical Engineering Department, Battersea Polytechnic, Battersea Park Road, London S.W.1.

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Courses at Northampton Polytechnic

Among the courses in pure and applied chemistry which are to be held at the Northampton Polytechnic, St John Street, London, E.C.1, during the session 1955-56 are part-time day and evening courses in Fuel Technology, for the City and Guilds examinations, and in Corrosion Science, for the examinations of the Institution of Metallurgists.

A number of special evening lecture courses have also been arranged, among them "Liquid Fuels, Their Properties and Applications" and "Research and Investigational Methods in Corrosion Science".

Another course of interest to members of the petroleum industry is "Heat Transfer, with Special Reference to Fuel Technology".

Enrolment for these courses is from 2 p.m. to 8.30 p.m., 19 to 21 September inclusive.

Fourth World Petroleum Congress

A tremendous success. This must be the considered verdict on the Fourth World Petroleum Congress which opened in Rome on 6 June and remained in session until 15 June. Tremendous is certainly the adjective which can legitimately be applied to the membership, which is stated to have been in the neighbourhood of 4500, with a high proportion of ladies accompanying their menfolk.

Truly it was a "world" Congress, for it brought together members of the petroleum industry from forty-four countries. As might be expected, the largest contingents were from Great Britain, the United States, Italy, France and the French Union, and Germany, who between them accounted for at least seventy-five per cent of the total, but it is of importance that countries outside the main producing areas were included in the list.

The spaciousness and splendour of the venue—the EUR—was a surprise even to those who had seen in this and other journals photographs of the buildings in which they were to meet and discuss. As noted in our April issue, the Congress Building and the Civilization Building were originally planned as permanent exhibition sites in 1942 but were not completed until ten years later. For the World Petroleum Congress both these buildings were needed to cover all requirements and excellent arrangements were made for transport by coach between them.

Technically, this Congress followed the lines of its predecessors. As will be seen from Table 1, practically every phase of the science and technology of petroleum was the subject for discussion during the working sessions, which numbered over one hundred. It was not possible for one person to be present at more than a few of the sessions, but in general there was a good attendance at most of them and the impression gained was that in many sessions the discussion was good and contributed much to the knowledge of those who were present. It must be admitted, however, that in some cases the discussion seems to have been stifled by a too rigid adherence to rules which had the effect of limiting the freedom of discussion so essential to any technical meeting.

Those concerned with the organization for recording and transcribing the discussions are to be congratulated on the speed with which the transcripts were ready for perusal and amendment by authors. This should enable the full report of the Congress Proceedings to be published with a minimum of delay.

The complete report of the Congress will be published in ten volumes by Carlo Colombo, whose address is Via Campo Marjio 74, Rome, Italy. Each volume will cover one Section and will include a report of any discussion which followed the presentation of a paper. The tenth volume will deal with general matters and will no doubt contain the special lectures.

THE FORMAL OPENING

The Congress was formally inaugurated on the evening of 6 June when, in the "Orazi e Curiazi" Hall, the Mayor of Rome, Salvatore Rebecchini, greeted in the name of the City of Rome, the delegates gathered therein and in the adjoining gardens of the Palazzo Caffarelli. Also present in the hall

A number of the British delegation travelled by BOAC charter from London Airport and reports indicate their complete satisfaction with this class of travel.

TABLE I

PAPERS AT THE FOURTH WORLD PETROLEUM CONGRESS

	Number of Papers
SECTION I—GEOLOGY AND GEOPHYSICS	
Reports following some resolutions taken at Third World Petroleum Congress	2
Regional geology:	
America	5
Mediterranean Europe	2
Middle Europe	4
Africa	3
Asia	2
	16
Geology of reservoirs	2
Origin and accumulation of oil	4
Palaeontology and ecology	6
Geophysics	7
Correlation of geological and geophysical studies	4
Total Section I	41
SECTION II—DRILLING AND PRODUCTION	
Drilling fluids	4
Well completion	2
Drilling techniques	3
Borehole surveys	3
Primary production	8
Secondary production	2
Material problems	6
Terminology of petroleum reservoirs	1
Total Section II	29
SECTION III—OIL PROCESSING	
General problems	2
Physical operations in oil processing	8
Desulphurization	3
Catalytic reforming	4
Catalytic cracking	7
Thermal conversion of heavy residuums	2
Various chemical operations in oil processing	2
A symposium on oil shale	4
Atmosphere and water pollution by petroleum products	4
Hydrogenation	2
Total Section III	38
SECTION IV—PRODUCTION OF CHEMICALS FROM PETROLEUM: PROPERTIES AND APPLICATIONS	
Production and utilization of olefins	4
Oxidation of hydrocarbons	7
Various developments	14
Total Section IV	25

	Number of Papers
SECTION V—COMPOSITION OF PETROLEUM: ANALYSIS AND TESTING: MEASUREMENT AND CONTROL	
Petroleum composition and properties	12
Sampling and analysis	5
Apparatus and methods of instrumental analysis	6
Correlation between physico-chemical properties and composition of petroleum products	1
Analysis of impurities and trace constituents	4
Total Section V	28
SECTION VI—UTILIZATION OF PETROLEUM PRODUCTS	
Asphalts and bitumens	3
Waxes and paraffins	2
Lubricants	8
Heavy fuels	4
Fuels and combustion in diesel engines	4
Fuels and combustion in spark-ignited engines	6
Uses of petroleum products in gas industry	4
Total Section VI	31
SECTION VII—CONSTRUCTION OF EQUIPMENT: MATERIALS: CORROSION	
Petroleum refinery engineering	3
Construction materials	8
Corrosion and protection of equipment	6
Total Section VII	17
SECTION VIII—TRANSPORT, STORAGE, AND DISTRIBUTION	
Storage and transportation	3
Pipelines and terminals	6
Total Section VIII	9
SECTION IX—ECONOMICS, STATISTICS, AND EDUCATION	
Training and management	3
Technical aspects of economic problems	7
Total Section IX	10
GRAND TOTAL—233	

Arriving at the Congress building on registration day are (left to right) *Mrs and Mr H. S. Gibson, W. C. Dickerman, H. Harper, Mrs and Mr E. N. Hague, Mrs and Mr E. Le Q. Herbert, J. A. and Mrs Oriel, while* (right) *E. J. Sturgess sorts out the mass of literature which each delegate received and Mrs Sturgess no doubt wonders how it is to be transported.*

Dr E. W. Murphree speaking at the opening ceremony in the Orazi e Curiazi Hall at the Campidoglio.

were a considerable number of the leading citizens of Rome. During his welcome, the Mayor stressed the importance of the occasion and the pleasure which Rome had in welcoming such a vast number of scientific and technical men.

Dr E. V. Murphree, chairman of the Permanent Council of the World Petroleum Congress, expressed the gratitude of the Council for the effort made by the Italian oil industry in backing the Congress in every way. The General Organizing Committee, under its chairman Professor Boldrini, had done an outstanding job.

Outlining the history of previous petroleum congresses, Dr Murphree referred to the 1933 Congress, of which he said Dr A. E. Dunstan, a past-president of the IP, was the moving spirit. At the second Congress, in Paris in 1937, the Permanent Council was set up largely because of the efforts of Mr T. Dewhurst, also a past-president of the IP.

The Hague Congress, third in the series, in 1951 was attended by 2753 delegates and their ladies and it was expected that over 4000 delegates and ladies would be present during this congress. The Council were particularly glad to see so many ladies present, for the social side of the Congress was one of its most important features, providing an opportunity of making new and seeing again old friends.

When asked by his associates what benefits came from World Petroleum Congresses, Dr Murphree said he had replied: (1) That the Congress offered a forum for discussion of technical questions on a worldwide basis; (2) the sharing of technical knowledge was most important for the industry; (3) in the sessions and social gatherings they got to know and understand each other better; (4) the information and knowledge gained from the papers and discussions was most valuable in the training of their successors.

Concluding, Dr Murphree said that the energy needs of the world were steadily growing. The needs of Europe, particularly, were expanding at a rapid rate. The oil industry had a heavy responsibility in helping to meet these needs and he was sure that the knowledge shared at this Congress would be of real assistance in meeting that responsibility.

Professor Marcello Boldrini, President of the Congress, after referring to its organization, said that the essential reason for the Congress was that petroleum constituted perhaps the most apparent element, and together with electricity and coal, one of the most dynamic factors of modern civilization. Owing to petroleum, the friendly horse, which had served man in peace and war for at least 70,000 years, was on the way to almost total disappearance.

After referring to Italian achievements, Professor Boldrini said that one hundred years ago, on 13 May 1854, a British Patent was granted to two Florentine physicists—Father Barsanti and Engineer Matteucci—for a gas engine which really worked. An air-hydrogen or air-illuminating gas mixture was exploded by an electric spark in a cylinder and created a rotating motion. On 12 June 1857, the same inventors were given a British Patent for an improved motor.

The Congress in 1959 would celebrate the centenary of the Drake Well, and Professor Boldrini said that Italy was proud that the Fourth Congress coincided with the centenary of the Florentine gas engine.

The Minister of Industry, Bruno Villabruna, then addressed the assembly, and said that Italy had in the last five years taken an important place in Europe on account of her refining industry. Thanks to the skill and endeavours of her technicians and workers, Italy now had no need to import oil for agricultural use, gasoline, or fuel oil and had even become an oil-exporting country.

At the conclusion of the opening ceremony, the delegates were guests of the Mayor of Rome at a party in the Capitol Museum and in the gardens of the Palazzo Caffarelli. The halls and galleries of the Capitol Museum were open and the visitors were much impressed by the works of art and sculptures displayed therein. Also, the Capitol hill afforded a magnificent, and to many their first, view of the Roman Forum, the Palatine, and the Colosseum.

THE SPECIAL LECTURES

As is customary at a World Petroleum Congress, four special lectures of general interest were presented by eminent authorities. All these plenary sessions were held in the Aula Magna in the Congress Building and on each occasion a large audience listened attentively. The lectures and their authors were:—

The Evolution of Oil Exploration. *P. T. Cox, M.B.E., M.A., M.Inst.Pet., exploration manager and chief geologist, The British Petroleum Co. Ltd.*

In and Around the Congress Building

(Above) *Over the Congress building flew the flags of all participating nations and—*

(Below) *The IP Stand, decorated with pictures of British oil achievements, was a port of call for U.K. delegates.*

—inside, the central hall was always full of delegates discussing various matters.

(Above) *Among those present were Dr E. Kroch, A. E. Langstone, H. M. Gell and—*

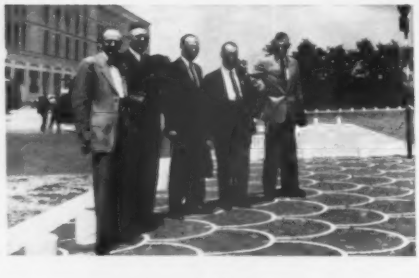
(Below) *The three ladies who looked after the registration of U.K. delegates were very efficient and extremely charming.*

—(front row) *Mrs W. E. Callingham, Mrs E. T. Borrows, Dr R. Schnurmann,* (back row) *Dr F. B. Thole, H. H. Eley, and W. E. Callingham.*

(Above) *Mrs A. Cluer, Mrs V. Biske, and D. A. Hough partake of a cooling drink during the heat of the day, while—*

(Below) *Just arriving for the day's work; J. H. G. Carlile, Dr W. E. J. Broom, M. J. Kemper, Dr E. B. Evans, and D. Royle.*

—F. Kenyon, D. Wilson, W. G. A. Bos Winkel, Capt. G. P. Claridge, and R. M. Smart talk shop on the CBMPE stand.



Basic Principles for the Organization of Applied Chemical Research. *Prof J. C. Junkers, Professeur titulaire à l'Université de Louvain.*

Energy Resources. *Prof W. K. Lewis, Emeritus Professor of Chemical Engineering, Massachusetts Institute of Technology.*

The Development of the Natural Gas Industry in Italy. *Ing. E. Mattei, chairman of Ente Nationale Idrocarburi.*

These four addresses are summarized below.

Oil exploration

The history of the exploration for petroleum could, according to Mr Cox, be arbitrarily divided into five main periods. The first or "primitive" period was up to the beginning of the Nineteenth Century and was connected with sporadic uses of petroleum derivatives—bitumen and asphalt. During this period surface manifestations were employed and there was some boring activity based on such indications.

The second period was from the beginning of the Nineteenth Century until the Drake Well in 1859. Drilling was also actively carried out around 1850 in Russia, Roumania, Poland, and Canada.

The third period, from 1859 to the end of that century, saw thousands of exploratory borings in the U.S.A. and elsewhere, but still the criteria were entirely empirical. Nevertheless, to this period might be ascribed the application of geology to petroleum and the birth of the anticlinal theory.

Between 1900 and 1930, the fourth period, scientific methods were affirmed in petroleum search, including the use of geophysical methods.

The last period, from 1930 to date, constituted maturity and included the application on an ever-increasing scale of new and improved geological and geophysical techniques.

Search for oil still remained a risky undertaking financially as, even with the best modern scientific methods, the only way of ascertaining the existence of petroleum was by boring. Boring was expensive and involved the combined efforts of a complex organization.

Although petroleum geology was still a science of probability, its value in petroleum search was most considerable if only because it offered a probability of success. In recent years physics had contributed to the knowledge of geological structure and had reduced the number of exploratory borings required to identify a particular formation. Where data from borings and from surface evidence was insufficient to permit a prognosis regarding the structure of reservoir rocks, geophysical methods could furnish indications on which some idea of the structure could be based.

A busy scene viewed from behind the enquiry counter where a team of very efficient ladies answered readily many enquiries concerning organized functions and excursions.

In conclusion, Mr Cox said that new petroleum discoveries would for many decades follow a rhythm sufficient to satisfy demands. But if demand exceeded supply there were still large unexploited reserves of materials from which substitutes could be obtained—oil shale, bituminous sands, and coal. The course of the discovery of petroleum in various countries would depend as much on policy and economics as on geology and he was optimistic in regard to the future, insofar as facts had always contradicted those who foresaw a rapid exhaustion of the world's oil reserves.

Applied Chemical Research

The progress achieved by the chemical industry was dealt with by Professor Junkers from the viewpoints of the direct influence which scientific research had on its evolution and also of the repercussions of the evolution itself on the tuition given to researchers and technicians.

That equal results were not attained in all countries was due not only to the volume of chemical production and the processes used, but also to the varying initiative of the industrial groups. The under-developed countries were more inclined to accept the *status quo*, and the gaps between developed and undeveloped countries tended to become wider.

The petroleum industry had undergone substantial changes and further changes were likely, due to nuclear energy and to the use of petroleum products for chemical synthesis. Innovations in metallurgical processes also made

Angelo Jacono (left), *editor of* Rassegna Petrolifera, *toasting his guests at a luncheon he gave to members of the world's oil press. Some of the guests are seen to the right and include George Sell* (Institute of Petroleum), *K. B. Barnes* (Oil and Gas Journal), *M. Kravtchenko* (Machinery Lloyd), *B. O. Lisle* (Oil Forum), *W. Hull* (American Chemical Society). *All present welcomed the opportunity of meeting their colleagues from many countries.*

Guests of Langley Alloys Ltd. at their cocktail party included (left to right) *A. A. Rowse, G. Skript, R. E. F. de Trafford, Mrs A. J. G. Waters, and Mrs and Mr E. J. Joint (Commercial Minister to the British Embassy in Rome).*

(Above) *A party returns from one of the excursions, all showing signs of their enjoyment.*

(Below) *W. Jamieson, D. C. Ion, and M. E. Hubbard enjoying lunch at Rocca di Papa during an excursion to the Castelli Romani.*

possible products of exceptional quality and resistance. These factors might help under-developed countries to reduce their disadvantages but recently the well-developed countries had made new advances.

Progress in the field of chemical engineering was responsible for the advance of the American chemical industry after the first world war. The new methods were excellent when applied to industrial processes based on physics but did not include fundamental studies of the chemical phenomenon itself.

Referring to chemical thermodynamics as a research method, Professor Junkers said the limitations of this were such that recourse to chemical kinetics was necessary to establish rules permitting interpretation of new chemical reactions.

In regard to the organization of research work, an adequate team of qualified researchers was necessary to carry out simultaneous studies quickly to ensure effective results. The training of the researchers should be all-round rather than specialized and the team leaders and research directors should be of high scientific standard and personal qualification. Finally, he said that there should be stricter co-operation between universities and industry.

Energy Resources

Professor Lewis said that the significance of energy in modern life was far more important than ever before. Although the global quantity at present available was sufficient, there was no doubt that the sources of energy were irregularly distributed. The problem was the better utilization of available energy and much had been and was being done in the technique of converting fuel into mechanical or electrical energy

Rarely was energy available where required for use and transport and storage were factors to be considered.

Dealing with petroleum reserves, he said he was optimistic about recent discoveries and about the replacement of petroleum with shale oil as far as the U.S.A. was concerned.

As regards new sources of energy, while the installation of central thermo-electro-nuclear plants of high power was now quite certain, nothing had been done towards the industrial use of thermo-nuclear energy obtained from transformation of light elements.

Petroleum remained the most significant source of energy and, concluded Professor Lewis, liquid fuels would play a fundamental role in world economy for a long time.

Italian Natural Gas Industry

At the fourth and final plenary session Engineer E. Mattei said that Ente Nationale Idrocarburi (ENI) produced 90 per cent of Italy's total output of methane gas. Today that amounted to 12 million cubic metres daily compared with the same quantity annually ten years ago.

This rapid increase in gas availability caused technical and legislative problems in regard to transport, but despite this Italy's pipeline network was the largest in Europe. At the end of 1954 it had a total length of 3805 kilometres, an average diameter of 250 millimetres, and a capacity of over 20 million cubic metres per day.

In 1945 the then small gas production was used wholly as fuel. In 1954, when consumption reached three billion cubic metres, use for industrial fuel was 65 per cent, for autotraction 6 per cent, for chemical production 7 per cent, and for thermo-electric purposes 14 per cent.

After discussing the economics of the development of Italy's natural gas industry, Mr Mattei referred to the effect of recent discoveries of crude petroleum in Sicily and in Abruzzi. Assuming that the products from the indigenous petroleum could compete with methane for various uses, the latter could be employed more widely for chemical

synthesis, and for domestic purposes. Concluding, he said that Italy should view its policy on energy sources as a single problem and arrive at a rapid solution, keeping in mind future developments and scientific progress.

THE BANQUET

On the evening of 8 June the formal banquet of the Congress was held in the Excelsior Hotel, about 1500 delegates and their ladies being in attendance.

The chair was taken by Professor Boldrini, President of the Congress, who in his speech particularly welcomed the presence of the ladies.

He was followed by Lt-Col. S. J. M. Auld, who spoke as Treasurer of the Congress and as President of the Institute of Petroleum. He had been asked to take as his subject the lesser known uses of petroleum and the presence of the ladies took his mind to the relationship of petroleum to clothes and cosmetics. But, he said, the most important uses of petroleum were as yet undiscovered. At present we were blowing petroleum to pieces and re-building the fragments—frequently to make better explosives. We still knew far too little about the composition and chemistry of our oil.

When nearly 100 years ago Pennsylvania seepage oil was sold as medicine, the label on bottles of "Kier's Petroleum or Rock Oil" said:

> "The healthy balm from Nature's secret spring
> The bloom of health, and life, to man will bring;
> As from her depths the magic liquid flows,
> To calm our sufferings, and assuage our woes."

Could anyone say fairer than that in relation to petroleum in our modern life, concluded Colonel Auld.

Ing. J. Colomo, chairman of the Mexican delegation, referred to the discovery of petroleum in America before the time of Columbus. He cited the chronicles of the Jesuit missions of Father Delaroche and many historical references to oilfields in America from Gonzales Fernandez de Oveido to Oroze y Berra.

Art and petroleum was the subject chosen by Prof M. F. P. Malschaert, leader of the Belgian delegation, who said it was easy to discover many points of contact between the world of art and letters and the petroleum industry. One of the greatest artists of petroleum history was R. J. Forbes who, in his work on his researches that went back 5000 years, mentioned the use of Mumija, an asphalt product, to preserve mummies.

Dr E. V. Murphree, chairman of the Permanent Council, thanked all those of the Italian Organizing Committee for the work they had accomplished.

After reviewing the history of the petroleum industry, he referred to atomic energy. It must not be thought, he said, that atomic energy would fully replace petroleum. The latter would for many years remain a source of world energy.

Other speeches were made by M. René Navarre (France) on "Petroleum and Banquets"; by Mr A. A. G. Scheiferdecker (Holland) on "Petroleum and Flowers"; by Dipl.-Ing. G. Schlicht (Germany) on "Petroleum and Antiquity"; by Dr R. K. Stratford (Canada) on "Petroleum and Patience"; and by Dr G. Théry Fombona (Venezuela) on "Petroleum and Progress".

ENTERTAINMENT AND SOCIAL FUNCTIONS

Apart fom the Banquet, there were many official and other functions associated with and centred around the Congress. With a venue in Italy it was only natural that opera should be included and delegates and their ladies were guests of the Unione Petrolifera and its Associates at a Gala Performance at the Opera House. The opera chosen was Verdi's *La*

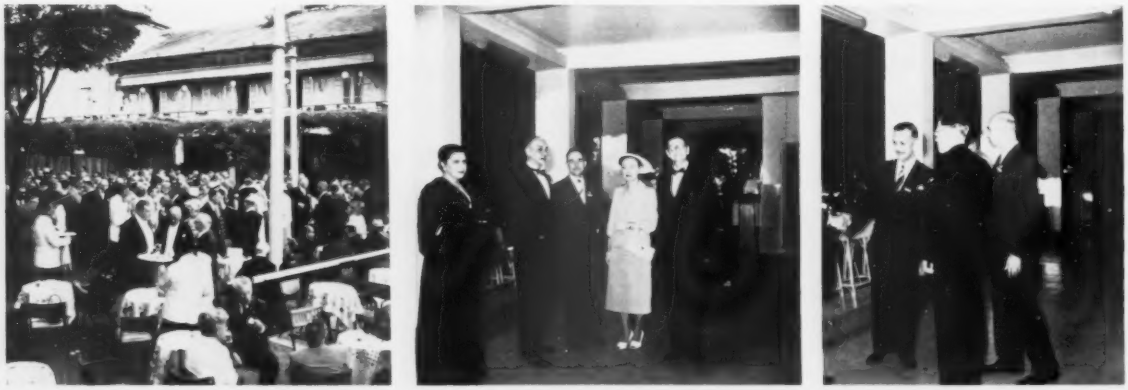
(Above) *During the Congress the British Petroleum Company presented the première of their new and fascinating film,* The New Explorers, *which tells the story of world oil search. This photo shows part of the audience watching the film at one of the three performances.*

(Above) *One of the models parading before the ladies of the Congress during the Fashion Show.*

(Below) *The enchanting scene in the Basilica di Massenzio during the symphony concert and* (inset) *a small section of the large audience.*

(Above) *Douglas Wilson, Chairman of CBMPE, receiving some of the guests at the Council's Cocktail Party. They included* (left) *Sir John Maud,* (left centre) *Mr and Mrs H. S. Gibson,* (right centre) *Mr and Mrs R. G. Roberts, and* (right) *Mr and Mrs J. Scott.*

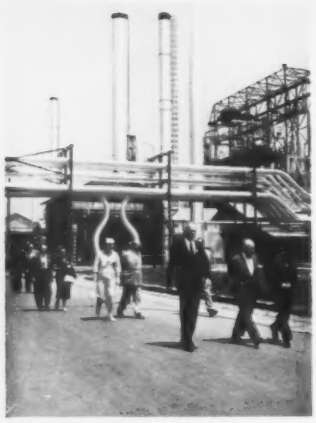
(Below) *A general view of the CBMPE Cocktail Party and* (centre) *Mrs Frank Kenyon, Douglas Wilson, Monsieur and Mme. R. E. Garde, and Frank Kenyon.*



(Left) *The President of the Italian Republic conversing with members of the Permanent Council and of the Organizing Committee at a special reception to over 70 delegates during the Congress. The British representatives included T. Dewhurst and H. S. Gibson, C.B.E. (IP past-presidents), Dr E. B. Evans (IP vice-president), C. Chilvers (IP honorary secretary), and D. A. Hough (IP general secretary).*

At the British National Committee's Cocktail Party

(Top left) *Col. S. J. M. Auld looks very pleased with the success of his Committee's party as he chats to Lady Maud and Mrs E. J. Sturgess.* (Top right) *E. J. Sturgess, J. A. Oriel, W. S. Ault, and Mrs C. E. Spearing.* (Centre left) *A. C. Hartley, Sir John Maud, and W. E. V. Abraham.* (Centre, right) *Mrs and Dr E. B. Evans, Mrs and Mr V. Biske, Mrs J. S. Parker, and D. A. Hough.* (Bottom, left) *Mrs H. Hyams, J. S. and Mrs Parker, H. Hyams, and Mrs George Sell.* (Bottom, right) *E. C. Masterson* and *T. Dewhurst.*



Post-Congress excursions included a visit to Naples and here some of the delegates are seen in the refinery of Socony - Vacuum Italiana.

Traviata and, in order to allow as many as possible to attend, performances were given on two evenings.

Those who were fortunate enough to attend either performance must have been impressed with the acting, not only of Virgina Zeani as Violetta Valery, but of the whole cast, with the orchestra under its conductor Vincenzo Bellezza, and with the stagecraft and the general setting

Unione Petrolifera were also hosts at a symphony concert by the orchestra of the Accademia Nazionale de Santa Cecilia under its conductor Fernando Previtali, which was given in the Basilica di Massenzio. This enormous temple, of which only three arches now remain, was started by Maxentius and completed by Constantine. The orchestral platform had been built in the centre arch, part of which also serves as cover for some of the audience, the seating accommodation spreading beyond into the open.

Ministry of Industry Reception

By far the largest reception during the Congress was that given by the Minister of Industry, Bruno Villabruna, in the Diocletian Baths. Over 4000 people attended and took the opportunity to visit the Baths which were built by the Emperor Diocletian at the end of the III Century, the great halls of which are full of Roman sculptures and statues. The soft indirect lighting added to the attractions of the buildings, which now house the National Museum of Rome, and their contents.

Other Receptions

Most petroleum and supply companies took the opportunity of entertaining their delegates or their friends and most delegates found it impossible to accept all the invitations at their disposal. One of the most delightful receptions was that given by the Council of British Manufacturers of Petroleum Equipment. Held in the gardens of the Casino della Rosa in the Villa Borghese, it was attended by many members of the Council, including Mr Douglas Wilson, its chairman, and a large number of guests from many countries. Being in the open in the cool of the evening, it was a welcome change for those who had spent the heat of the day on Congress affairs.

During the intervals in the sessions the bar was a good meeting place. Here (left) *we see N. E. F. Hitchcock* and *G. H Thornley doing a spot of paper work, and* (right) *A. J. Foster and W. F. Jelffs quench the Rome thirst.*

The British National Committee held a reception on the first day of the Congress at the famous Villa Palazzi, at Camilluccia, which Mussolini built in 1935 for Clara Petacci. Since it is no longer required for its original purpose it is now used as a fashionable restaurant noted for its food and for a glorious view over Rome. Guests at the reception included members of the National Committees of other countries.

Similar receptions were held by other National Committees or by the Embassies in Rome.

AUDIENCE BY THE POPE

On 10 June the Pope granted a special audience to delegates to the Congress and a large number gathered in the vast hall of the Vatican. After giving his blessing from the throne, the Pope addressed the delegates and referred to the necessity to hold periodical meetings such as the World Petroleum Congress "to accelerate, through personal contacts, discussions and exchanges of ideas, the progress of activity inseparably linked to the march of civilization".

After referring to many and various developments in technical matters relating to oil production and refining, the Pope said that at the present time, when one sees more and more clearly that social problems must prevail over economic ones, nobody has the right to confine himself to technical specializations or to administrative tasks. In the section dealing with the training of personnel, delegates had underlined that the industry's leaders were taking increasing care of their employees; it was important that the latter should put all the resources of their initiative at the disposal of their employers.

THE CLOSING SESSION

The final scene of the Fourth World Petroleum Congress was held in the Auditorium of the Vatican City, when a representative audience gathered to hear the closing speeches. The chair was taken by Professor Boldrini, President of the Congress, and members of the Permanent Council and various officers of the Congress were present on the platform.

Dr E. V. Murphree, chairman of the Permanent Council, first paid a tribute to the work of the Italian Organizing Committee. Everyone, he said, had enjoyed the hospitality of their Italian hosts who had spared no effort to make the visit pleasant and profitable. There were many special events all would remember and there had been many opportunities to make new friends and to renew old acquaintances.

The growing world interest in science and engineering in relation to petroleum was evidenced by the large and international character of the attendance. The technical sessions had been very well worthwhile and favourably commented upon.

The Fifth Congress

Continuing, Dr Murphree said that the Permanent Council had accepted the invitation from the U.S. National Committee to hold the next Congress in 1959 in the United States. That would coincide with the centenary of the Drake Well. The date and place had not been settled but he extended to all, on behalf of the U.S. National Committee, a cordial invitation to attend.

Dr A. A. Muston, general secretary of the Congress, announced that three resolutions had been submitted from

the sections. Two had come from Section I, the first recommending that the research and study on sedimentology inaugurated by the Third Congress should be continued and suggesting a symposium within the next four years to report progress. The second resolution asked for the continuance of the efforts towards clarification of geological terminology and for a report to be submitted to the next Congress.

The third resolution concerned the need for a more appropriate method of expressing viscosity-temperature relationships of lubricating oils and asked that the matter be referred to a competent technical and scientific body.

The Italian Minister of Finance, Ezio Vanoni, said that science and technology would benefit from the Congress. He pointed out that petroleum and natural gas were of great interest to Italy. With no coal and with hydroelectric production almost at its economic limit, the use of hydrocarbons must be encouraged. Natural gas had made a considerable contribution to the energy resources of Italy, said the Minister, and recent oil discoveries gave a feeling of optimism for the future.

René Navarre, Director-General of l'Institut Français du Pétrole, stressed the significance of the high attendance at the Congress and the importance to be attached to the papers and to the discussions which had followed their presentation.

Professor Marcello Boldrini, said that the success of the Congress was due to the energy and organizing ability of Dr Arturo A. Muston, the general secretary, to Dr Riccardo Beer, the vice-general secretary, to all the members of the Secretariat and of the various technical and other committees, and equally to the charming young ladies who had looked after the information departments.

He also expressed his appreciation of the address made by Pope Pius XII and to the high honour conferred upon the Congress by the audience granted by the President of the Republic.

The future of the Congress depended essentially on the future of petroleum and indirectly on the future of humanity. He was not qualified, he said, to judge whether the research into the peaceful use of atomic energy represented a threat to the petroleum industry, but he outlined various events in the past which showed that the final outcome of technical and scientific progress had never been lost to humanity.

During the audience the Pope spoke to individual delegates.

In conclusion, Prof Boldrini said that man had known and used hydrocarbons as energy sources for 3000 years. They had become so essential a factor of our civilization that for a long time the development of petroleum consumption would continue, thereby creating employment, satisfying new needs, and diffusing the well-being which favourably affects man's healthy life span, and happiness.

At the conclusion of Professor Boldrini's speech the orchestra of the Accademia Nazionale di Santa Cecilia gave a recital of two pieces for strings. And so the Fourth World Petroleum Congress ended and the delegates dispersed to their homes or joined one of the tours through Italy which had been arranged for them. Some remained to enjoy the sunshine and scenery of Italy as private tourists, and all carried with them pleasant memories of the Congress and of Rome.

The scene at the closing session with members of the Permanent Council and of the Italian Organizing Committee on the platform.

Trade Literature, etc.

Valves

Sir W. H. Bailey and Co., makers of valves, pumps, gauge testers, turnstiles, etc., specialize not only in an intensive range of pressure regulators but also in supplying valves, particularly very large ones, which may be difficult to obtain. Literature describing these products is available from the Company's Albion Works, Patricroft, Manchester.

Foxboro-Yoxall Products

Foxboro-Yoxall Ltd. are now supplying the Stabilflo range of valves ready drilled to take the type CYSG3 Vernier Valvactor.

Automatic Laboratories

An "Analmatic" automatic laboratory designed and built by Baird & Tatlock (London) Ltd. in co-operation with the Atomic Energy Research Establishment, Harwell, was shown at the Geneva Atomic Energy Conference. It had previously been on display at the British Instrument Industries Exhibition at Earls Court, London.

Electronic Programme Controller

The Electronik Circular Chart Cam-Operated Programme Controller is the name of a new addition to the industrial instrumentation products of Honeywell-Brown Ltd. Time–temperature programmes for many processes can be pre-arranged and reproduced again and again by means of this new equipment.

Protective Paints

A new brochure giving details of a wide range of protective paints is available from Allweather Paints Ltd., specialists in chlorinated rubber paints, 36 Great Queen Street, London, W.C.2.

New Company

A new company, The Coniston Engineering Co Ltd., has been formed which will design and arrange the erection of complete process plants for the chemical, fine chemicals, food, and petroleum industries and for all kinds of construction projects for heavy industry.

Among the members of the Board of directors is B. S. Brailey, B.Sc., M.I.Mech.E., F.Inst.Pet., who was previously with the "Shell" Refining and Marketing Co. Ltd.

The National Supply Co.

The London offices of The National Supply Company are now at City Wall House, Chiswell Street, London, E.C.1.

British Instrument Industries Exhibition

H. F. Dever, President of the Scientific Apparatus Makers of America, made a special visit to Britain during June to attend the British Instrument Industries Exhibition. Mr. Dever is also President of the Minneapolis-Honeywell Regulator Company—the American associates of Honeywell-Brown Ltd. During his visit he discussed the future of instrumentation with executives of the British company and representatives of companies using Brown instruments.

Among the instruments shown at the exhibition were the prototypes of two new products by Kelvin and Hughes (Industrial) Ltd.—a three-position electronic temperature controller, for extremely critical control of temperature, and a multiline recorder with six-inch chart.

Examples from ranges of spectrophotometers and crystallographic equipment were exhibited by Unicorn Instruments Ltd. and a selection of scientific apparatus was displayed by Griffin and George Ltd.

NEW ESSO FUEL OIL NAMES

Esso Petroleum Company's three grades of residual fuel oil have been re-branded in the interests of uniformity.

The changes are as follows:—

Inland Trade Schedule

Present Brand Name	*New Brand Name*
Esso Fuel Medium	Esso Fuel Light
Esso Fuel Heavy	Esso Fuel Medium
"3000 Secs" Fuel	Esso Fuel Heavy

Marine Trade Schedule

Brand names changed as for Inland Trade Schedule.

Schedule of Bunker Prices

Present Brand Name	*New Brand Name*
Esso Fuel Medium	Esso Marine Fuel Light
Esso Fuel Heavy	Esso Marine Fuel Medium
Esso Bunker Fuel	Esso Bunker Fuel

Prices, specifications, and conditions of sale are not affected by these changes.

CRUDE OIL PRODUCTION

	1955	
	June	*Jan.-June*
	Brl.	
Trinidad Petroleum Development Co. Ltd.	283,507	
Kern Oil Co. Ltd.:		
California	99,806	
Trinidad	78,778	
	Tons	
Iraq Petroleum Co. Ltd.	2,050,616	11,840,071
Basrah Petroleum Co. Ltd.	569,061	3,355,138
Mosul Petroleum Co. Ltd.	106,209	637,532
Qatar Petroleum Co. Ltd.	444,003	2,594,320
Kuwait Oil Co. Ltd.	4,375,281	27,123,557

Iranian Production and Refining

The June production figure for Iraanse Aardolie Exploratie en Productie Maatschappij N.V. was 1,429,000 tons, totalling 6,891,000 tons for the period 1 January to 30 June. The refinery throughput of Iraanse Aardolie Raffinage Maatschappij N.V. for June was 609,000 tons, totalling 3,713,000 tons for the period from 1 January to 30 June.

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THE NAPLES EXHIBITION

Coincident with the World Petroleum Congress, an International Petroleum Equipment Exhibition was held in the Mostra d'Oltremare, Naples, and on two days during the Congress special excursions were arranged and well-attended.

Although it was stated that the 250 exhibitors represented eleven countries, including the U.K. and the U.S.A., the majority of the equipment appeared to be of Italian or continental manufacture. The material exhibited was certainly wide in scope, varying from geophysical equipment to domestic gas burners, from a complete drilling rig to a kerbside pump.

The Co-ordinating Research Council of the United States of America

On the invitation of the Institute of Petroleum, a delegation of the Co-ordinating Research Council of the U.S.A. recently visited this country to explain to interested parties in Europe, the development, aims and work of the Council. Meetings were accordingly held in London on 30 June and 1 July, which were attended by a large number of representatives from organizations in the United Kingdom and the Continent.

At a General Meeting, held in the afternoon and evening of 30 June, the CRC delegation presented their case in four separate papers; these were followed in the evening by a film and open discussion of the papers.

On the following morning, 1 July, members of the CRC were invited to meet the Engine Tests of Lubricants Panel of the Institute of Petroleum to describe and discuss the work being carried out by the CRC in developing their new test engine and the progress and lines along which the development of test methods was proceeding. A number of senior representatives from interested organizations in the U.K. and on the Continent were invited to this meeting.

The full texts of the above-mentioned papers, together with a full account of the discussions and the proceedings of the meeting with the Engine Tests of Lubricants Panel will appear as soon as possible in the *IP Journal*.

The knowledge which has been gained from these meetings should provoke much thought on the part of both the petroleum and automotive industries, particularly in the U.K. It may eventually be decided that it would not be desirable to set up an organization in the U.K. strictly along the lines of the CRC. This might well be the case since there are several essential differences in the patterns of the two industries in the U.S.A. and U.K. Nevertheless, the discussions which took place at the IP/CRC meetings during these two days must have provided much food for thought as to the necessity, and the means, for bringing these two great industries closer together so that they might the better understand and study the various problems which are of common concern.

This is a most important matter which will undoubtedly be studied closely by the Institute of Petroleum, and should any closer collaboration of a formal nature be necessary, the Institute will obviously have a prominent part to play on behalf of the petroleum industry.

The "CRC"

Members of the CRC who attended the meetings were M. K. McLeod (General Manager of CRC), A. J. Blackwood, W. G. Lovell, V. G. Raviolo, T. B. Rendel and W. T. Gunn. Other prominent Americans present were Errol Gay, A. E. Miller, L. C. Burroughs and Lt.-Col. W. Montgomery.

The first meeting was held at the headquarters of the Institution of Mechanical Engineers, by kind permission of that Institution. It was under the chairmanship of Lt.-Col. S. J. M. Auld, O.B.E., M.C., D.Sc., President of the Institute, and was attended by a number of prominent British people, among them Lord Geddes, Sir Harry Ricardo, and J. H. Pitchford, Chairman of the Automobile Division of the Institution of Mechanical Engineers.

Invitations were issued to a number of research and similar organizations in Europe which were known to be working on or were interested in research on fuels and lubricants; among those who participated in the meetings were ten representatives from the U.S.A., six from France, eight from Germany, two from Italy, and one each from Belgium, Holland, Switzerland and Israel.

There were in all some 200 representatives of the petroleum and automotive industries present to hear four papers delivered by members of the CRC.

M. K. McLeod speaking at the IP/CRC luncheon.

The first two papers dealt with the aims and objects and the current programme of the CRC. They were "The Co-ordinating Research Council" by M. K. McLeod (General Manager of the CRC), and "The Current Programme of CRC" by T. B. Rendel (Chairman, Co-ordinating Fuel and Equipment Research Committee), and W. G. Ainsley (Chairman, Co-ordinating Lubricant and Equipment Research Committee).

The following two papers outlined what CRC means to the petroleum and automotive industries of the U.S.A. These were "What CRC Means to the Automotive Industry" by E. S. MacPherson (Vice-President, Engineering, Ford Motor Company), presented by V. G. Raviolo (Director of Engineering, Lincoln-Mercury Division, Ford Motor Company), and "What CRC Means to the Petroleum Industry" by W. J. Sweeney, (President of the Co-ordinating Research Council) presented by A. J. Blackwood (an assistant director, Esso Research and Engineering Company).

The presentation of these four papers was followed by the showing of a film covering some aspects of CRC field work and by a period of discussion.

Engine Testing of Lubricating Oils

The second meeting, on 1 July, took the form of a gathering of experts at the Café Royal to discuss the work being done on

IP/CRC COLLABORATION

Pictures taken by the Editor during the social functions of the recent IP/CRC meetings show (left to right in all cases): (1) *M. K. McLeod, Lt.-Col. S. J. M. Auld, Lord Geddes, and Lt.-Col. W. Montgomery;* (2) *R. Courtel, M. Lamoureux, and M. Plet-Beaupre, all of France;* (3) *K. Schneider (Germany), J. G. Withers and L. J. Richards (U.K.), and Dr H. A. van Westen (Holland);* (4) *H. Hyams (U.K.), T. B. Rendel, M. K. McLeod, Lt.-Col. W. Montgomery, and W. T. Gunn (U.S.A.);* (5) *R. Courtel (France), Prof E. Sibenaler (Belgium), and J. C. Cree (U.K.);* (6) *L. C. Burroughs and A. J. Blackwood (U.S.A.);* (7) *J. Groff (France);* (8) *Prof C. Zerbe and Dr Cramer (Germany);* (9) *A. E. Miller (U.S.A.).*

the development of engine tests of lubricating oils. This meeting was held under the auspices of the IP Engine Tests of Lubricants Panel of Standardization Sub-Committee No. 5 and was presided over by the Chairman of the Panel, Dr. N. Kendall.

Representatives of the CRC and the Institute outlined the progress which they had made in the evolution of test engines which would assist in evaluating the quality of lubricating oils. The importance of the subject was demonstrated by the large number of experts (50) from the U.K., U.S.A., and various European countries who were present and who participated actively in the deliberations. Delegates from all the countries represented at the meeting the previous day were present in strength at the Café Royal meeting.

A full report on this Panel meeting will also be included in the near future in the *IP Journal*.

Social Functions

Despite the concentration of these technical meetings into a short space of time, opportunities were provided for less formal exchange of opinions at an informal dinner held at the Park Lane Hotel on the evening of 30 June and at a formal lunch at the Café Royal on 1 July. Both these functions were under the presidency of Col. Auld.

The general opinion that the meetings had been most successful was given expression when Col. Auld rose to propose a toast to the CRC at the luncheon which terminated the meetings.

Col. Auld said that a most impressive and stimulating account had been given of the Council's activities, aims, and achievements and that this was bound to have a far-reaching effect on all who had heard it. This was particularly true in respect of the "getting together" of two great industries in the accumulation of fresh knowledge, and of the co-operation within a highly technical and organized field of application such as that of the petroleum and automobile industries. It was also true, however, in a much broader sense, in that there was a value in all human enterprise in viewing things from different angles.

Who first offered the hand of co-operation in America was immaterial, said Col. Auld, but he would like to think that the oil men were not behindhand in realising the importance of the rapprochement, and that the engineers were equally cordial. Between them they had built up an organization of considerable importance and certainly without parallel throughout the world.

As between the oil industry and consumer they were all well aware of the potential and individual closeness of co-operation which arose in individual cases, but in the United Kingdom it had needed dire emergency to bring the two industries into association for mutual and national benefit.

Col. Auld then referred to two such cases in which he had been directly and intimately concerned, and which had impressed him by the ease with which the association was arranged and the success which had attended the effort.

The first was the outcome of the vision of then Air Vice-Marshal Tedder who sought advice in 1939 regarding the lubrication of aircraft engines so that in the long run the Battle of Britain was not fought with out-moded oils. The second, later in the war, was the wider if not deeper issue regarding the lead susceptibility of the Army's I.C. engines. That great difficulty was also solved. Whilst the co-operative attitude had been approached on these occasions, however, the marriage had never been completed.

Finally, Col. Auld said that the members of the CRC had described their activities in such a way that one could no longer plead ignorance. He could give a firm assurance that the Institute of Petroleum would give the deepest consideration to the thoughts and experience of the CRC.

The toast to the CRC was seconded by Dr C. F. Bona, Chairman of the Fuels and Lubricants Committee of the Italian "Comissioni Tecnica di Unificazione Nell' Automobile" (CUNA), who expressed the feelings of the continental guests by thanking the President and the Institute for the opportunity the meetings had given to meet many distinguished scientists and research workers and to study that masterpiece of co-operative work, the American CRC.

To European engineers working in the automotive and petroleum industries the story of CRC was, said Dr Bona, an example and a lesson which would be considered deeply and admiringly when they returned to their own countries.

M. K. McLeod, responding on behalf of the CRC, first thanked the Institute for making it possible for them not only to present the story of CRC to the representatives of the petroleum and automotive industries of England but also to discuss the CRC with the automotive and petroleum people of so many countries. In particular he expressed his thanks to Mr Harry Hyams for all that he had done to ensure the success of the meetings.

Cousins meet at the IP/CRC luncheon — T. B. Rendel (left) *from the U.S.A., and Sir Harry R. Ricardo, F.R.S.*

Before he left the United States, stated Mr McLeod, he had anticipated that he would meet the technical people of different countries and would be discussing with them individual problems involving co-operation within their own countries, and the great need for co-operation between the automotive and petroleum industries, not only within their own borders but also with their friends in the other countries of Europe and America. He found differences in language and differences in the details of some of the general problems, but he was impressed by the fact that they were all thinking along the same lines.

The CRC organization, Mr McLeod stated, was designed to fulfil the requirements of industry in the United States. He gave the warning that CRC as it stood today was the result of over 30 years of development; it had had its own problems and had had to change its format as the need of industry changed. An organization to fulfil the needs of industry in Europe could draw on the experience of the CRC in establishing its broad objectives, but it was probable that there might be differences in its structure. He was convinced that the need for co-operative activity in Europe had been recognized and that the technical people of the automotive and petroleum industries would take the steps necessary to accomplish this co-operation. It would take time but the organization would grow and increase in usefulness as it grew. He was sure that it would be a success.

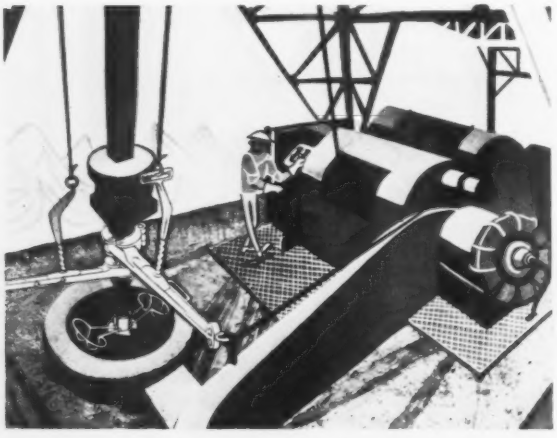
Concluding, Mr McLeod said that if he and his colleagues had been of any help in promoting co-operation between these two great industries in Europe, then they were more than amply repaid for their journey from the United States. They had been inspired by the meetings and the many friends that they had made, and he asked the CRC representatives to drink a toast to the Institute of Petroleum, coupled with the name of Harry Hyams.

H. Hyams, replying, said that when some 18 months ago Mr McLeod and Mr Rendel had discussed with him the possibility of detailed exchanges of views in London on the work of the CRC and IP in the field of engine testing of lubricating oils, following the World Petroleum Congress,

Books and Films

"Down a Long Way"

The clarity of the cartoon form makes it particularly suitable for imparting knowledge to the layman about the intricacies of the petroleum industry. In the new BP film *Down a Long Way* this medium has been used to good effect



The floor of the drilling rig. From the cartoon film "Down a Long Way".

to illustrate the work of geologists and geophysicists in prospecting for oil, and the operation of drilling.

This is a Halas and Batchelor production in Eastmancolor. Running time is 17½ minutes and it is available on free loan from the Public Relations Department, Shell-Mex and BP Ltd., Strand, London W.C.2.

"Station 307"

Commandant Cousteau, the famous French undersea explorer, who has recently undertaken research into the geological condition of the sea bed of the Persian Gulf, has now recorded features of his work in the Gulf in a new BP film, *Station* 307.

This shows the work of a team of geologists and aqualung divers which operated in the Persian Gulf in 1954 from the research vessel *Calypso*, which was equipped with a submarine gravimeter and other special scientific equipment. A gravimeter is seen in action on the sea bed and there are scenes showing divers taking samples from the bed for examination on board the *Calypso*.

Among the hazards of this underwater exploration is the presence of sharks, and divers must be alert to seek the protection of the strong cages in which they are lowered and raised from the sea bed.

This British Petroleum Company film runs for 19 minutes and is available on free loan from the Public Relations Department, Shell-Mex and BP Ltd., Strand, London W.C.2.

International Showing of "Project 074"

"Project 074", a Shell film dealing with the use of atomic energy in research into new lubricants, was shown at the International Conference of Scientists on the Peaceful Uses of Atomic Energy held in Geneva during August.

For the first time the Shell Film Unit, which made the film for the Royal Dutch/Shell Group in conjunction with the Atomic Research Establishment at Harwell, has made a Russian version of one of its films, for "Project 074" was screened in all five of the official languages of the conference—English, French, Russian, German, and Spanish.

British Petroleum Equipment

The 1955-6 catalogue of British petroleum equipment issued by The Council of British Manufacturers of Petroleum Equipment is now available. This is the fifth edition and the largest to date.

Apart from preliminary pages of classified information about members and their products, there are hundreds of catalogue entries, making a volume of 770 pages in all.

This catalogue is an invaluable publication, giving a detailed picture of the British petroleum equipment industry and the wide range of equipment, components, materials, and services which it now provides.

Price of the catalogue is £2 10s., plus postage, and copies are available from the Council at 79 Buckingham Palace Road, London, S.W.1.

"British Chemicals and their Manufacturers"

The 1955 edition of "British Chemicals and their Manufacturers, issued by The Association of British Chemical Manufacturers, contains some twelve thousand products listed systematically according to the British Standard—"Recommended Names for Chemicals Used in Industry". This latest edition is even more comprehensive than its predecessor and copies are available, free of charge, to persons or firms genuinely interested in the purchase of chemicals. Enquiries should be addressed to the Association, Cecil Chambers, 86 Strand, London W.C.2.

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they had not envisaged the boldness or scope of the meetings which had been held in these two days. So far as the IP was concerned these meetings had further demonstrated the desire of the Institute to extend international co-operation in petroleum technology with other institutions and organizations of a like character. The keenness of European friends to join in was clearly indicated by the many petroleum and automotive experts who had actively participated in the deliberations. In a free economy there were bound to be major rivalries in the petroleum industry but there were no petty jealousies.

His American friends, such as Bill Gunn and Lee Burroughs, knew of the ardent and genuine desire of the IP to promote U.S.-U.K. co-operation in standardization of test methods. Further, the continental friends of the Institute, particularly in France, Belgium, Holland, Italy, and Germany, with whom closer collaboration was constantly being developed, knew that the Institute was always ready to give them maximum assistance.

Mr Hyams concluded by thanking those who had co-operated with him in organizing these successful meetings, in particular Dr N. Kendall, and Mr J. C. Cree, respectively Chairman and Hon. Secretary of the Engine Tests of Lubricants Panel, and Messrs D. A. Hough, George Sell, and E. Herbert of the Institute staff.

Notes of the Month

Australasian Drilling Project

Frome Lakes Proprietary Ltd., in which The British Petroleum Co. Ltd. is a partner with Australian and American companies, has begun drilling its first well in the Gippsland area of Victoria, Australia. The well is known as Darriman No. 1.

In Papua, where B.P. is also associated with Australian and American interests in search for oil, drilling of Omati No. 2 well has stopped at 10,880 feet as it is not expected that oil or gas will be found in commercial quantities within reach of the drill.

New Pakistan Contract

Pakistan Constructors, the joint venture of D & C and William Press Ltd. and Morrison Knudsen Company of Pakistan, is to construct a 188-mile, 16-inch-diameter pipeline running from the Sui gas fields to Multan, later to be extended to Lahore with branch lines to Kot Addu, Montgomery, Jhang, and Maghiana.

Work will start on this contract in the middle of 1956 and is expected to be completed within six or seven months, at an estimated cost of £13,791,540.

The recently completed natural gas line between Sui and Karachi was also built by Pakistan Constructors.

"Border Sentinel"

The ninth in the series of ten tankers ordered by the Lowland Tanker Company for service with B.P.'s British Tanker Company fleet, *Border Sentinel*, was launched on 19 July. Built by Swan Hunter and Wigham Richardson Ltd., the 16,000-dwt *Border Sentinel* was launched by Miss Anne Common, daughter of the late Sir Andrew Common. Common Brothers Ltd. is one of the two companies participating with B.P. in the Lowland Tanker Company.

New Esso Bunkering Tanker

A 1070-dwt bunkering tanker, *Esso Poole*, was launched during June by Mrs A. W. Wooldridge, wife of A. W. Wooldridge, regional manager, Esso Petroleum Co. Ltd.

The vessel was built at the Hessle shipyard of Henry Scarr Ltd. and was specially designed to augment the Company's fleet of bunkering ships on Southampton Water. *Esso Poole* will have a high discharge rate and will be able to make a complete discharge in about two hours—thus enabling her to meet the rapid turn-round of the "Queens" and other large liners. The new vessel will also be used later for delivering supplies of fuel oil from the Esso refinery at Fawley to the new power station at Marchwood.

Dimensions of the *Esso Poole* are length overall 186 ft and breadth 33 ft. She will be able to carry 1170 tons of fuel oil when operating within the estuarial limits of Southampton. This will be contained in eight tanks each of approximately the same capacity.

New Dutch Oilfield

A new oilfield at Rijswijk, a suburb of The Hague, is now producing oil at a rate of some 30,000 tons per annum. Eight wells have been drilled in the area so far and five of these are producing oil in small quantities which is taken by tank lighter along the canals for processing at Shell's Pernis refinery.

A drilling concession in the province of South Holland, covering 41,000 acres and including the producing region, has been granted to N. V. Nederlandse Aardolie Maatschappij (N.A.M.)—a company which is owned equally by N. V. de Bataafsche Petroleum Maatschappij, one of the three main operating companies of the Royal Dutch/Shell Group, and the Standard Oil Company of New Jersey.

The possibility that oil was present in commercial quantities in that area was shown in 1953 when the first test well was drilled by N.A.M. and an oil-bearing stratum was discovered at about 4900 feet. As a result of tests additional wells were sunk and an extensive exploration programme was undertaken in the area between Rotterdam, The Hague, and Leyden. Highly detailed seismic surveying and test drillings were carried out but it is still too early to forecast the extent or future development of the oilfield. Present results are very modest in comparison with the 920,000 tons per annum produced at the Schoonebeek oilfield in the north-east part of the Netherlands.

Deep-Frozen Natural Gas

Deep-frozen natural gas from the Middle East oilfields may eventually be included among commodities imported into Europe.

Vast quantities of potential power are at present being wasted because there is no demand for natural gas in Middle East countries and no means of carrying it to populated areas.

In the U.S.A. natural gas is one of the main sources of energy and it is distributed by means of a network of pipelines from oil areas to storage depots in the main industrial areas. In 1954, 27 per cent of America's power requirements were met by natural gas and the demand was so great that it was necessary to import it.

A group of U.S. petroleum technicians has found that it would be technically possible to ship the gas in frozen form. Special refrigeration machinery would be used to reduce the gas to 1/600th of its normal volume by freezing to —260°C. The gas would then be stored in deep-frozen refrigeration tanks in special vessels.

This method has already been used to tranship gas from the Gulf of Mexico to Chicago, but the extremely high cost of building and equipping special ships is a serious obstacle to the adoption of the method for Middle East gas. Allowing for these enormous preliminary costs, it is estimated that natural gas could still be marketed cheaper than coal gas in most parts of Europe.

★ ★ ★

EUROPEAN CO-OPERATION IN THE PRODUCTION OF POWER

A suggestion that a Fuel and Power Economics Committee should be set up by the Council of the Organization for European Economic Co-operation (O.E.E.C.) is contained in a report recently submitted for examination by the Council of Ministers of O.E.E.C.

The Report, entitled "Intra-European Economic Co-operation in the Production and Distribution of Power," was prepared by M. Louis Armand, Chairman of the French State Railways, and contains proposals for direct or indirect collective action on the use of energy by O.E.E.C. member countries.

The Report was called for by the Council of O.E.E.C. to help it to decide whether action outside the national level was necessary to deal with the existing power situation in Europe, and whether, assuming this to be desirable, effective collective

action was possible. M. Armand's proposals are for a suitable procedure to give concrete expression to suggestions put forward in a Memorandum of 14 December, 1953, which raised the question of intra-European economic co-operation and gave a general indication of the way in which certain problems might be approached.

Questions concerning the discovery and use of crude oil and natural gas are, of course, included among those which are discussed from the intra-European point of view in this Report.

* * *

SYMPOSIUM ON MINERAL RESOURCES POLICY

A meeting to discuss a minerals policy for the United Kingdom has been arranged by the Institution of Mining and Metallurgy to take place on Thursday, 22 September at the Hall of the Royal Society of Arts, John Adam Street, Adelphi, Strand, London W.C.2. There are to be two sessions: 10 a.m. to 12.30 p.m. and 2 p.m. to 4.30 p.m.

The questions to be considered are whether some co-ordination of effort at every stage of production would be desirable to conserve supplies or expand output to the best advantage, and how such aims might be achieved.

The object of the symposium is to allow fuller discussion of proposals put forward in a paper by D. A. Oliver, C.B.E., director of the B.S.A. Group Research Centre. The theme of this paper is "that minerals productivity will be increased if greater co-ordination of the right kind can be established between all the interested parties"—geologists, mineral dressing and mining specialists, mining and finance houses, mining engineers, local territorial authorities, fabricators and users, and finally Government.

The papers which are to form a nucleus for discussion at the meeting will be printed and circulated to members of the Institution beforehand. They will be only briefly introduced at the time of the symposium. A limited number of copies of the papers will be available, free of charge, to non-members on application to the Secretary of the Institution, 44 Portland Place, London, W.1., from whom further details about the symposium can also be obtained.

* * *

HUMAN PROBLEMS OF INDUSTRIAL COMMUNITIES

A unique opportunity for practical study of the human aspects of industrialization will be given by His Royal Highness the Duke of Edinburgh's Study Conference on the Human Problems of Industrial Communities within the Commonwealth and Empire which is to meet at Oxford from 9 to 27 July, 1956.

It is intended that this conference, which has been actively sponsored by His Royal Highness the Duke of Edinburgh as patron of the Industrial Welfare Society, shall be a gathering not of research workers but of men and women of many races and nations who are facing practical responsibilities in industry and are prepared to exchange ideas freely and frankly on the tasks and opportunities ahead of them. The conference is to deal in particular with those factors which make for satisfaction, efficiency, and understanding both inside industrial organizations and in the everyday relations between industry and the community around it.

The Conference will be attended by 280 members, 90 from the U.K., and approximately 135 from the other countries of the Commonwealth and 55 from the Colonial territories.

All enquiries regarding arrangements for invitation to the Conference and details of the programme should be addressed to Peter Parker, Conference Secretary, Administrative Headquarters, 48 Bryanston Square, London, W.1.

Forthcoming Meetings

THE INSTITUTE

(At 26 Portland Place, London, W.1, 5.30 p.m.—tea 5 p.m.)

Modern Crude Oil Loading Techniques at Mina-al-Ahmadi, Kuwait. J. M. Dougary, B.Sc., F.R.I.C., F.Inst.Pet. (Kuwait Oil Co. Ltd). **14 September**

IP FAWLEY BRANCH

(At Esso (Fawley) Recreation Club, Holbury, 7.30 p.m.)

The Place of the Chemical Engineer in the Petroleum Refining Industry. H. E. F. Pracy, B.A., M.I.Chem.E. **23 September**

IP LONDON BRANCH

(At 26 Portland Place, London, W.1, 6 p.m.—tea 5.30 p.m.)

History and Development of the Petroleum Industry in the U.K. J. W. Eyre. **22 September**

IP NORTHERN BRANCH

(At Engineer's Club, Albert Square, Manchester 2, 6.30 p.m.)

The Place of the Chemical Engineer in the Petroleum Refining Industry. H. E. F. Pracy, B.A., M.I.Chem.E. **20 September**

* * *

SYMPOSIUM ON VAPOUR-PHASE CHROMATOGRAPHY

The Hydrocarbon Research Group of the Institute of Petroleum is arranging to hold a three-day meeting on the subject of Vapour-Phase Chromatography in London on 30, 31 May, and 1 June 1956. The programme will cover the whole field of vapour-phase chromatography and will be divided into two main sections:

(a) Theoretical Aspects
(b) Practical Techniques

Further information may be obtained on application to the organizing secretaries, Messrs D. M. Desty and H. C. Rampton, c/o The Research Station British Petroleum Co. Ltd., Sunbury-on Thames, Middlesex.

* * *

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Petroleum Technologist required by international organization. Age 35-40, possessing Degree and wide practical experience of Measurement, and Computation of Vegetable Oil Cargoes. Must be willing to reside on Continent and travel extensively at short notice. Reply, giving full details, qualifications, and previous experience to Box No. 1099.

Chemical Engineers or Applied Chemists are required by a major oil company for positions at its new refinery. The positions to be filled are for both senior and junior personnel. Applicants must be graduates and for the senior positions should have at least 10 years' experience in the petroleum industry in the capacity of Process Engineer, Plant Development Chemist, or Plant Control Chemist/Engineer. Experience should include Plant or Process Development, Process and Equipment Efficiencies, Process Calculation, Plant or Equipment revamping, and general Process Design. Modern housing accommodation is available. The company operates a Pension and Life Assurance Scheme, Sickness Benefit Plan, and Sports and Social Club. Applications, giving details of qualifications and experience, should be sent to Box No. 1098.

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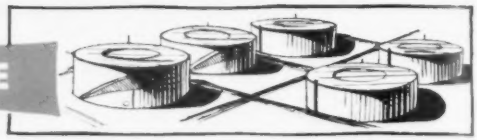

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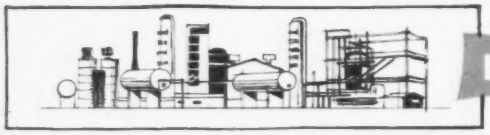

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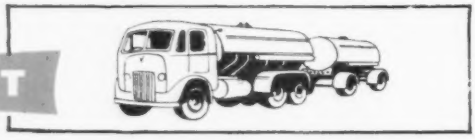

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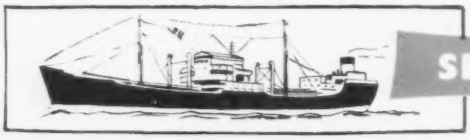

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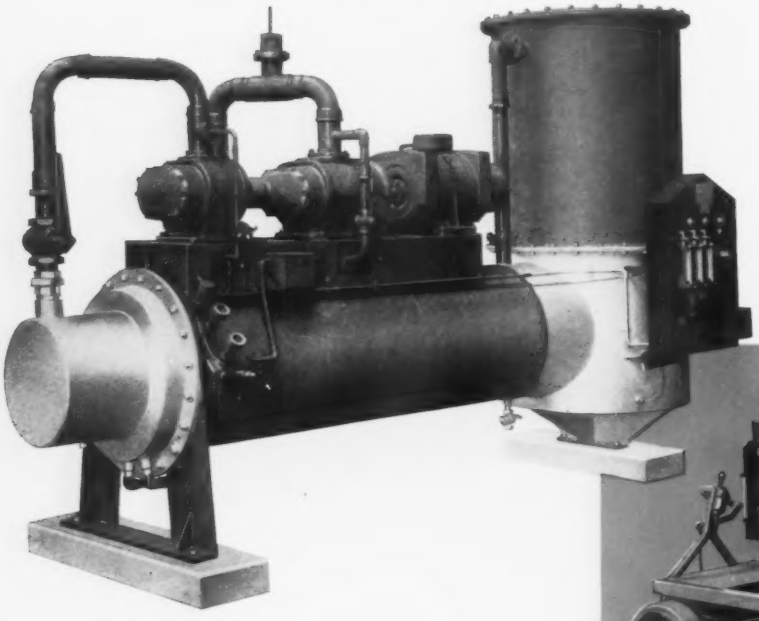

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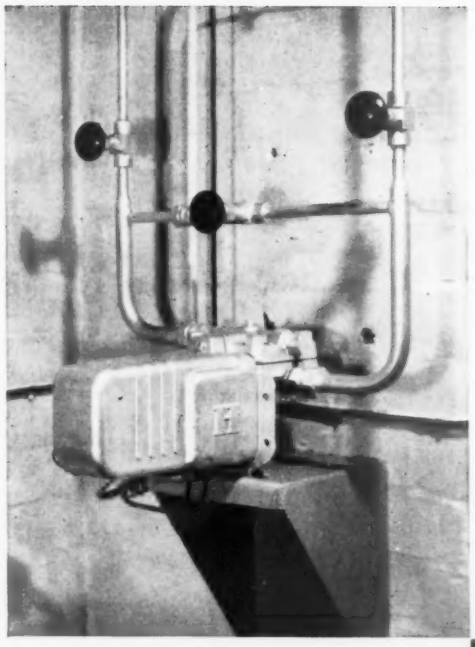

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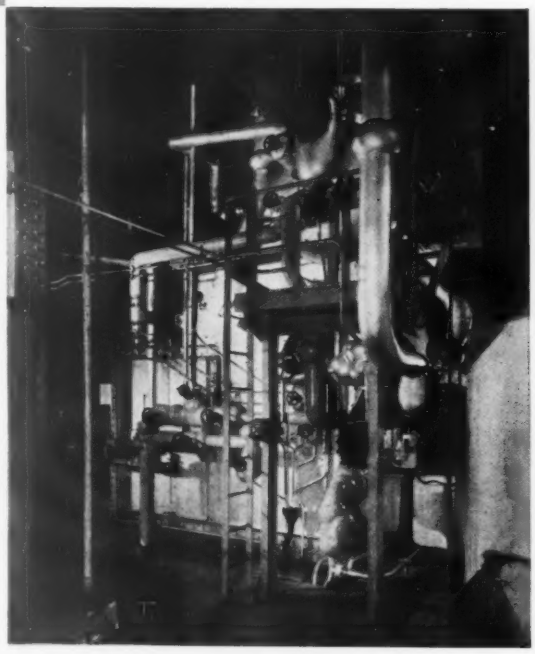
A Brown Differential Converter measuring steam flow from two water tube boilers at the Newport Works of Monsanto Chemicals Ltd.



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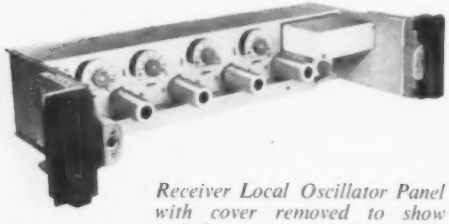

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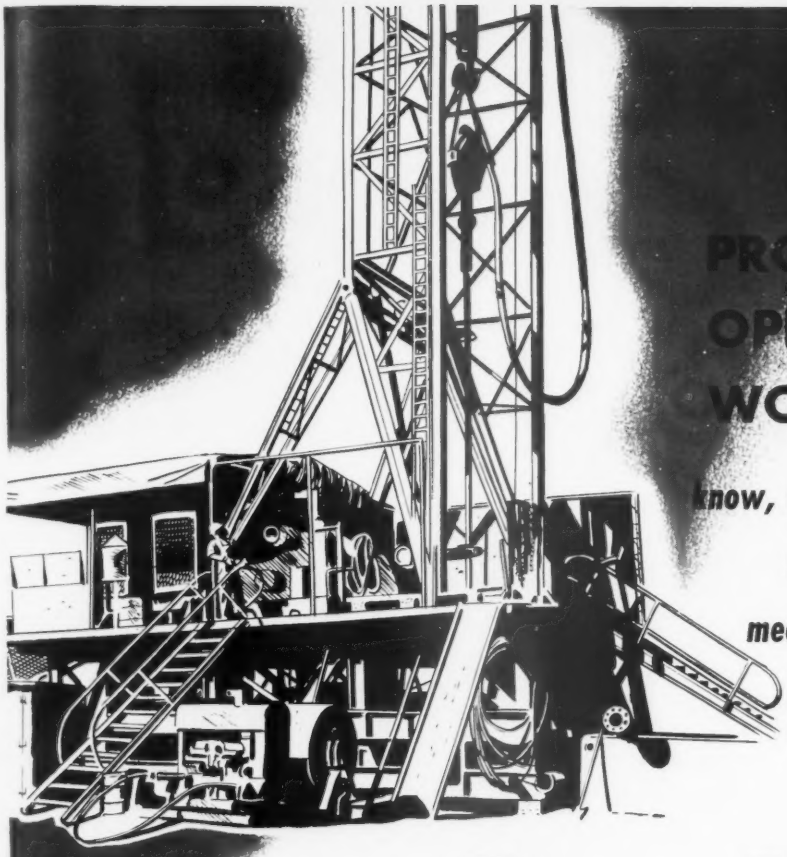

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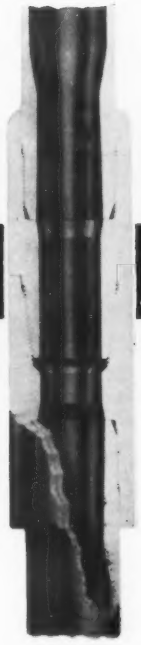

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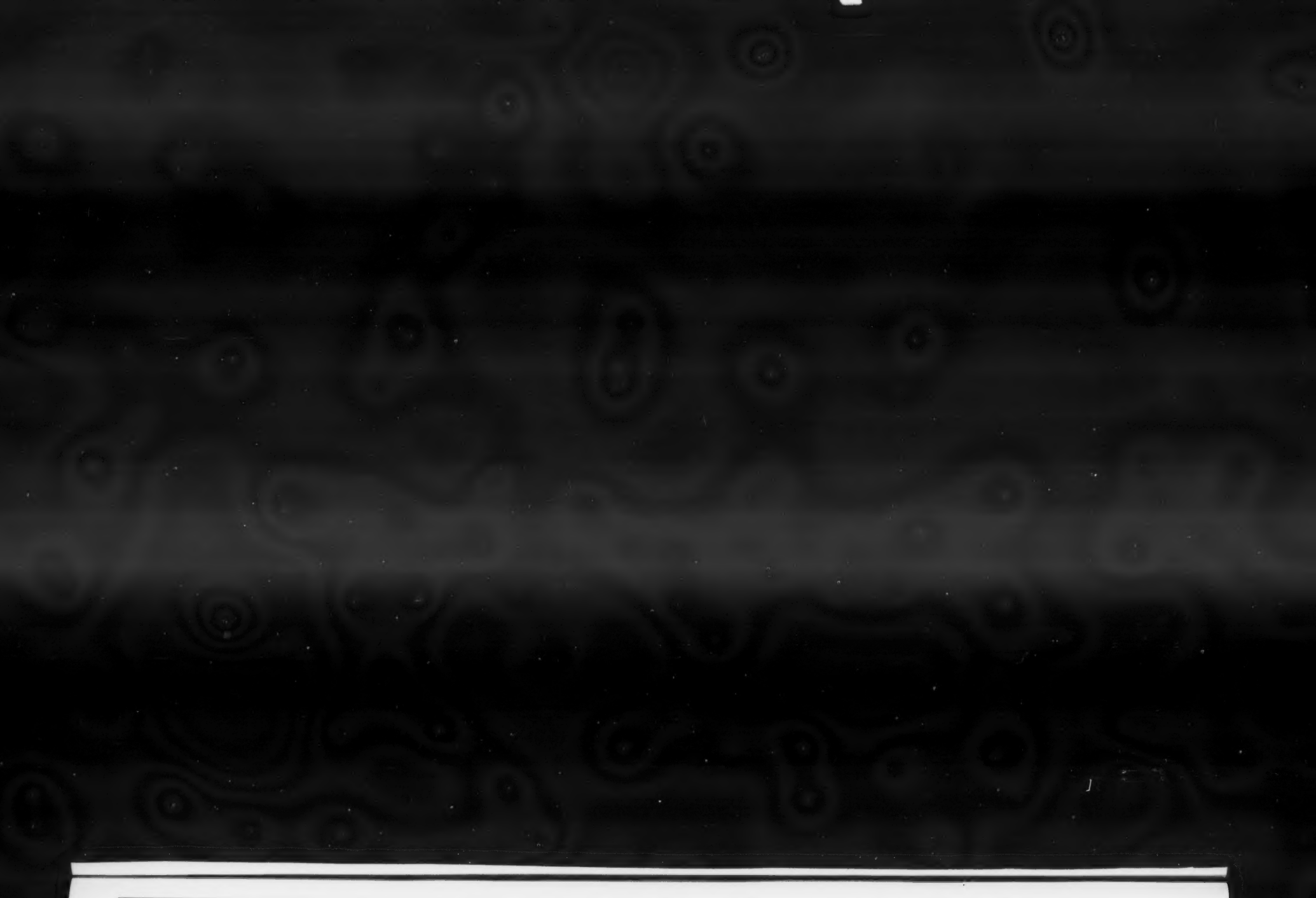

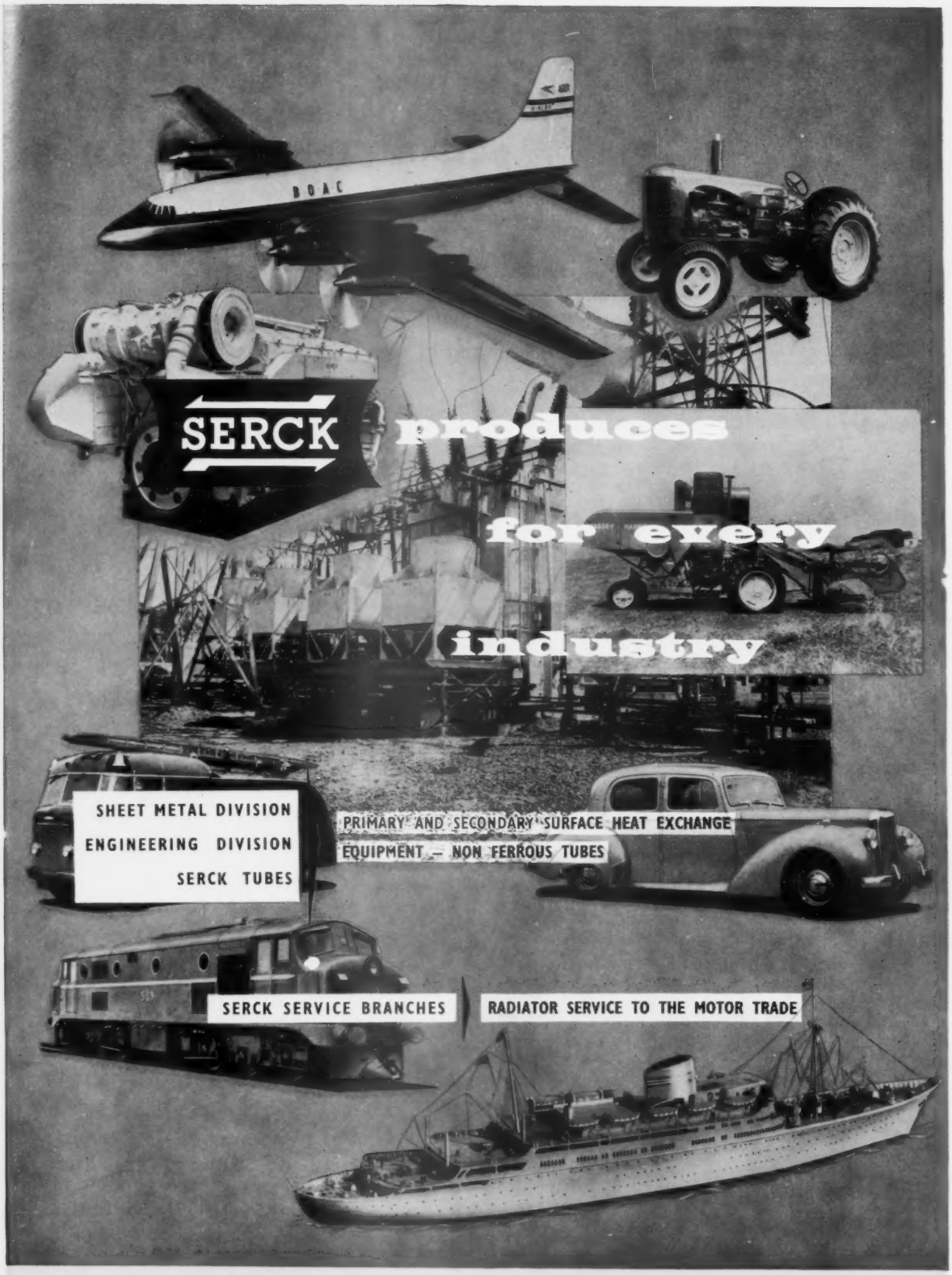

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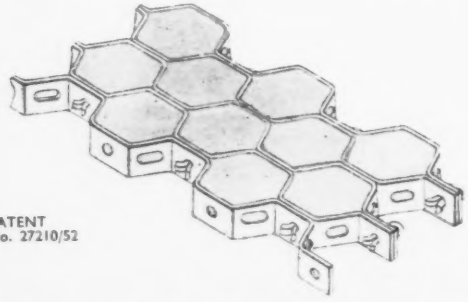

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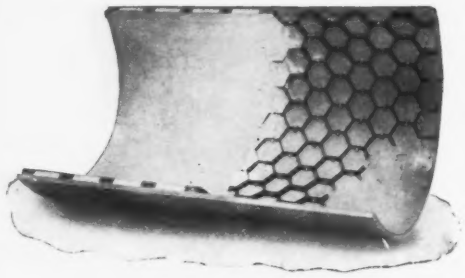

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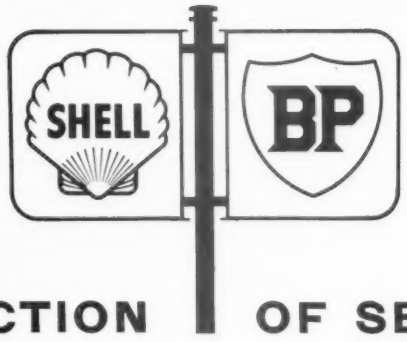

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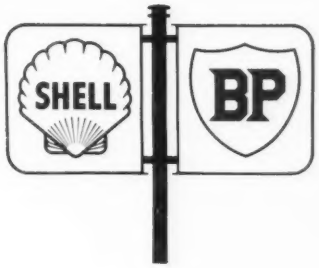

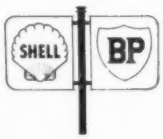

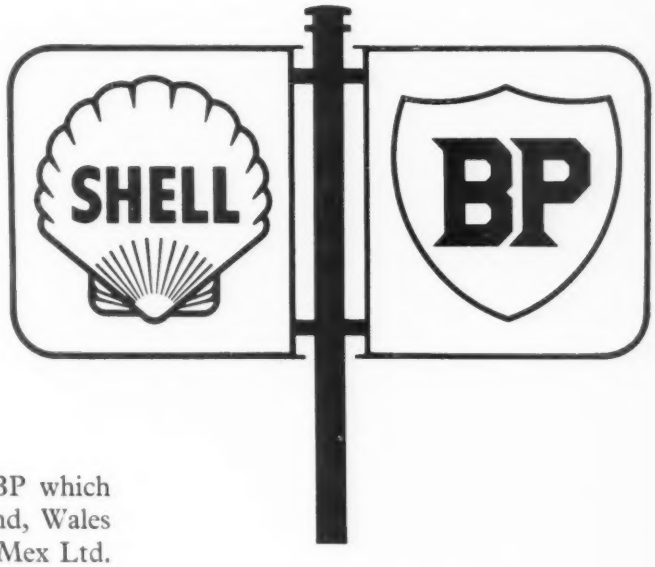

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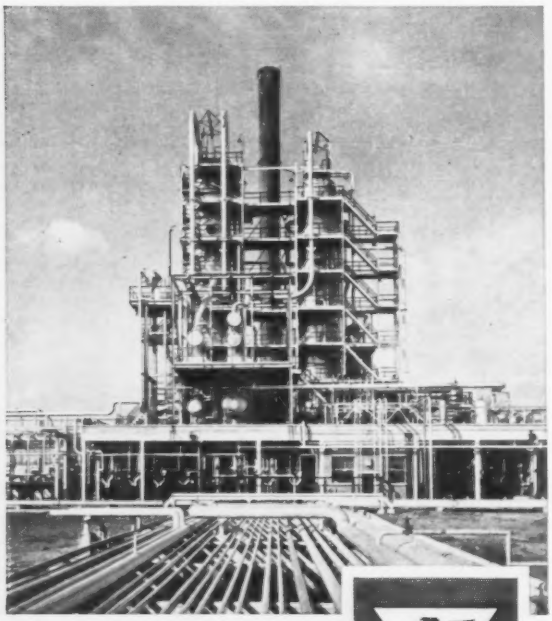

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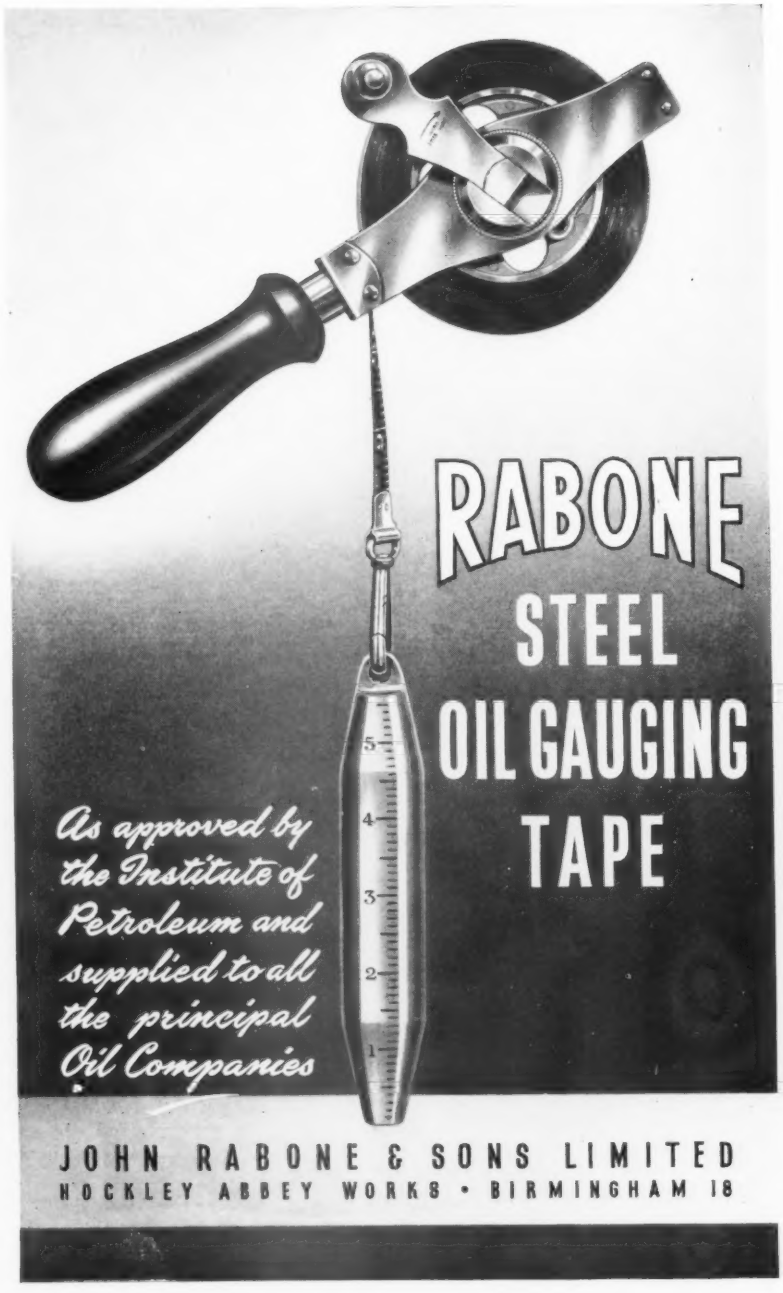
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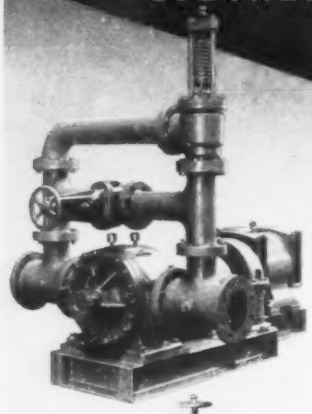
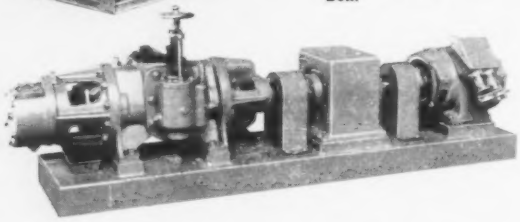


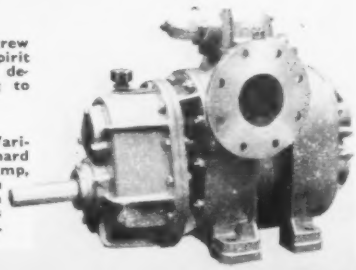
(Left)
Positive Acting Rotary Displacement Pump for the handling of Molasses and viscous fluids, electrically driven through totally enclosed Reduction Gear Box.

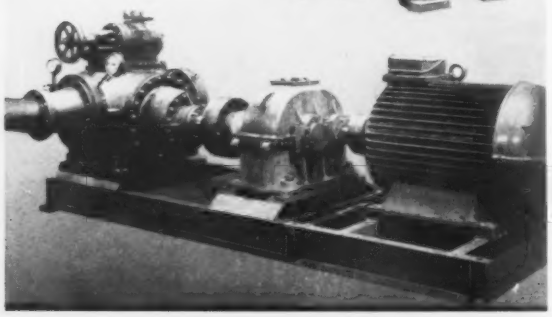
(Below)
Positive Acting Screw Displacement Spirit Pump, electrically driven through Wall Box.



(Right)
Positive Acting Screw Displacement Spirit Pump specially designed for fitting to Road vehicles.

(Below)
Positive Acting Variable Output Guinard Rotary Piston Pump, electrically driven through Reduction Gear Box, for Oils of varying viscosity.





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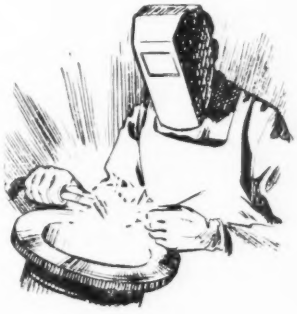

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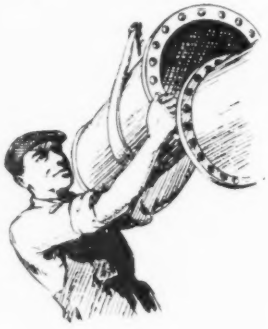

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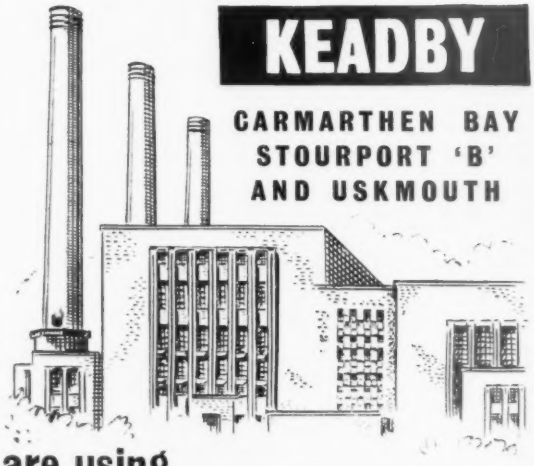

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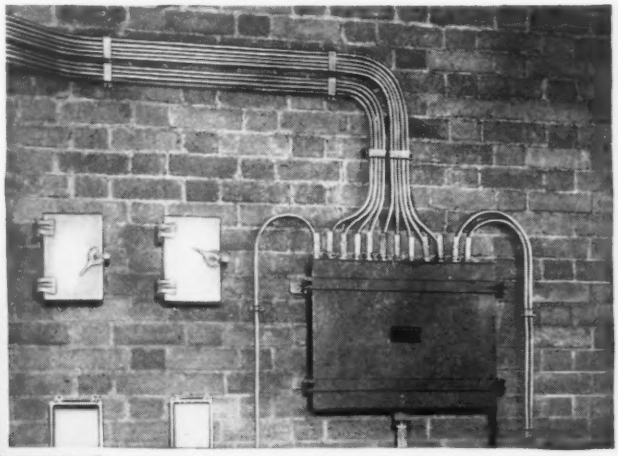

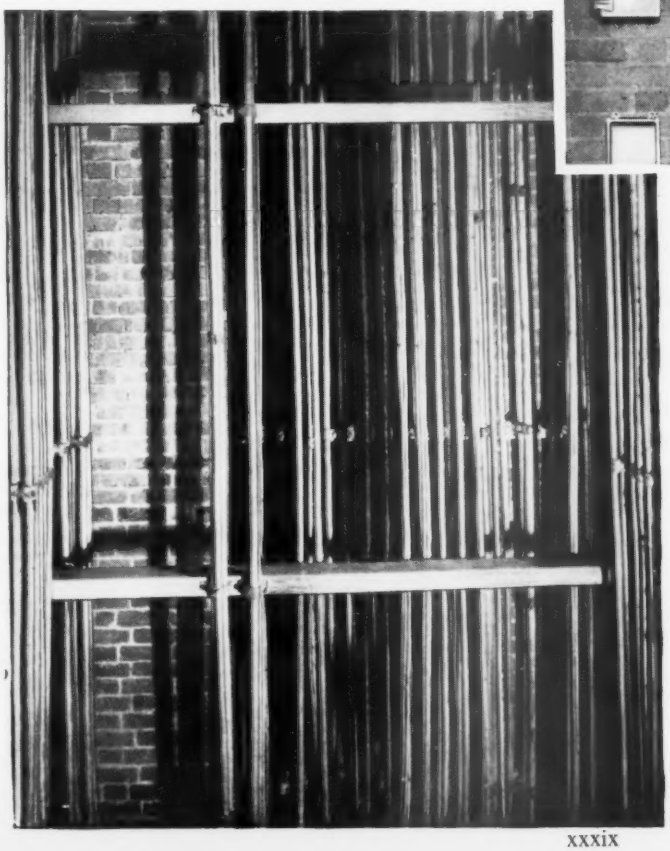

Above: Neatly installed formations of aluminium sheathed wiring cables terminating in a marshalling box.

Left: A main cable trunk at Keadby comprising 150 h.v. and l.v. cables, all but a few being aluminium sheathed.

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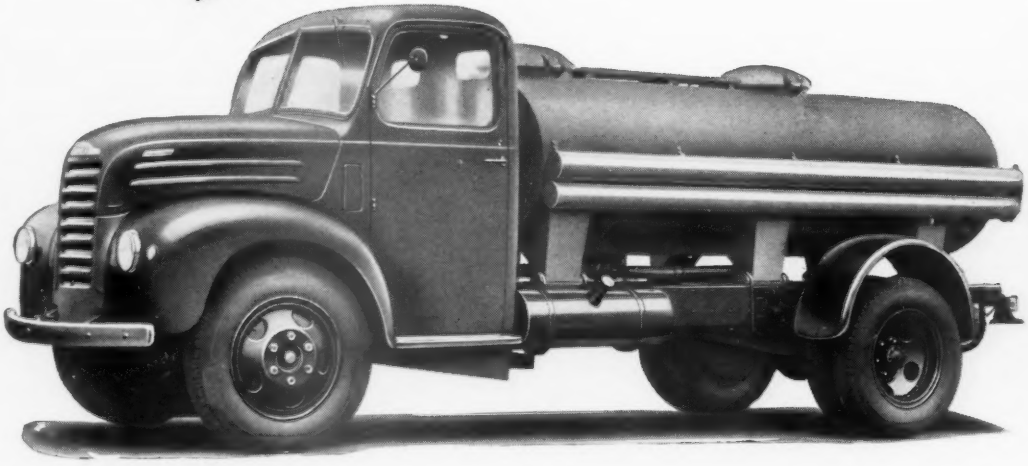

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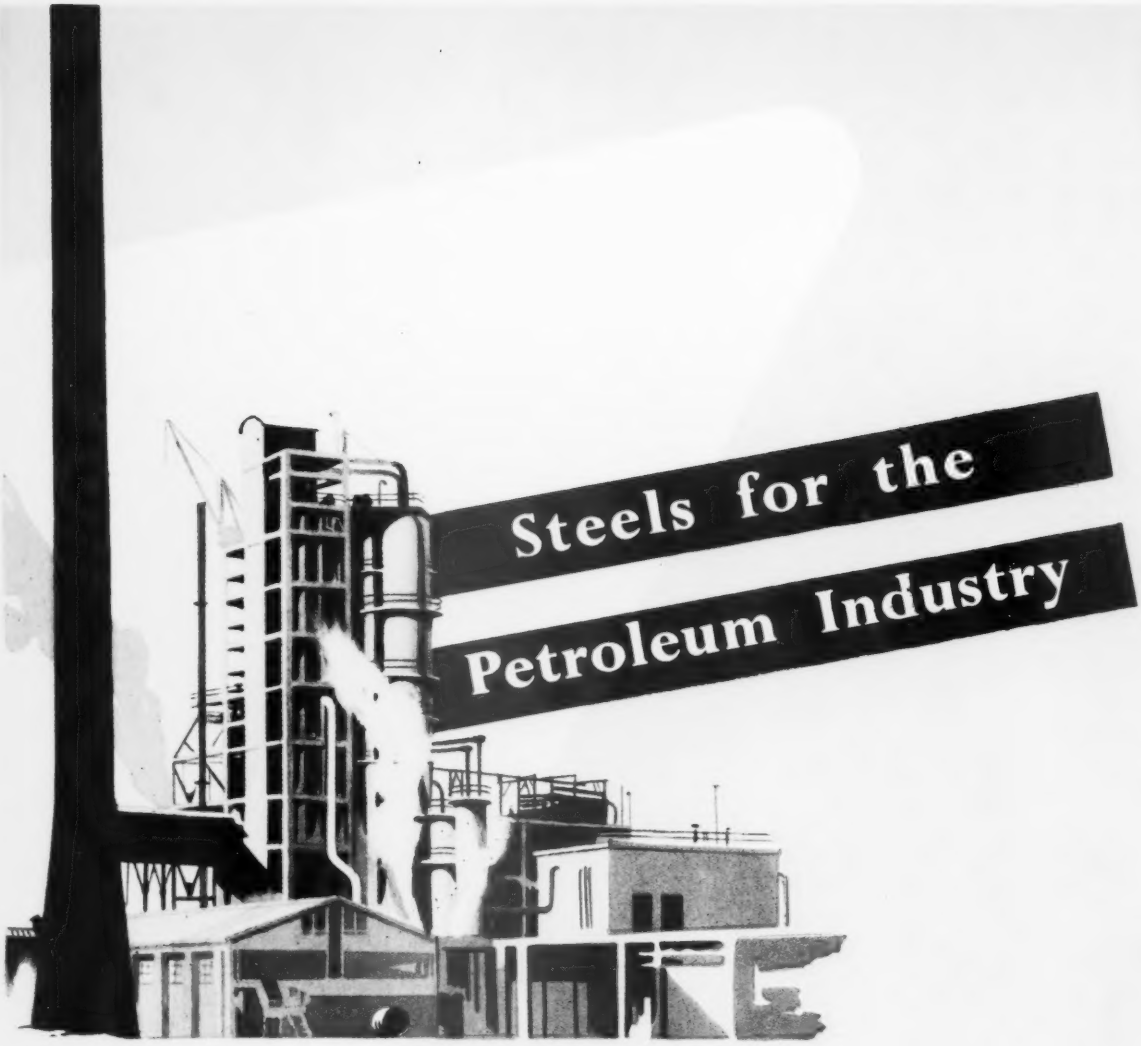

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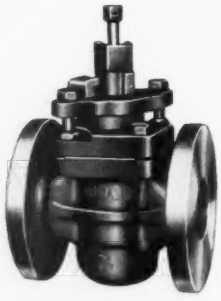
SENTINELS in the desert

These are not mines found in the desert after the last war, but the operating gear units of four 16″ Class 600 Hypreseal Valves on one of the major Middle East crude pipelines. The valves are seen here with the sheet steel protecting hoods removed; these hoods are locked round the gear units for protection against sand and dust, and against light-fingered or over-inquisitive attention.



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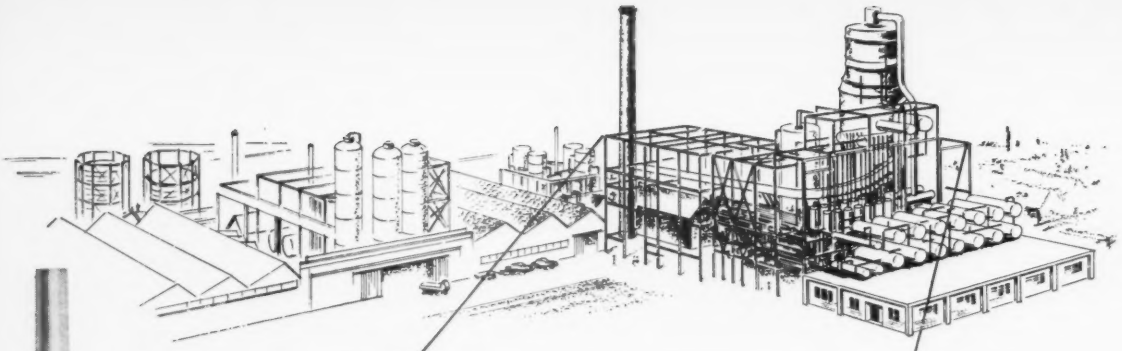

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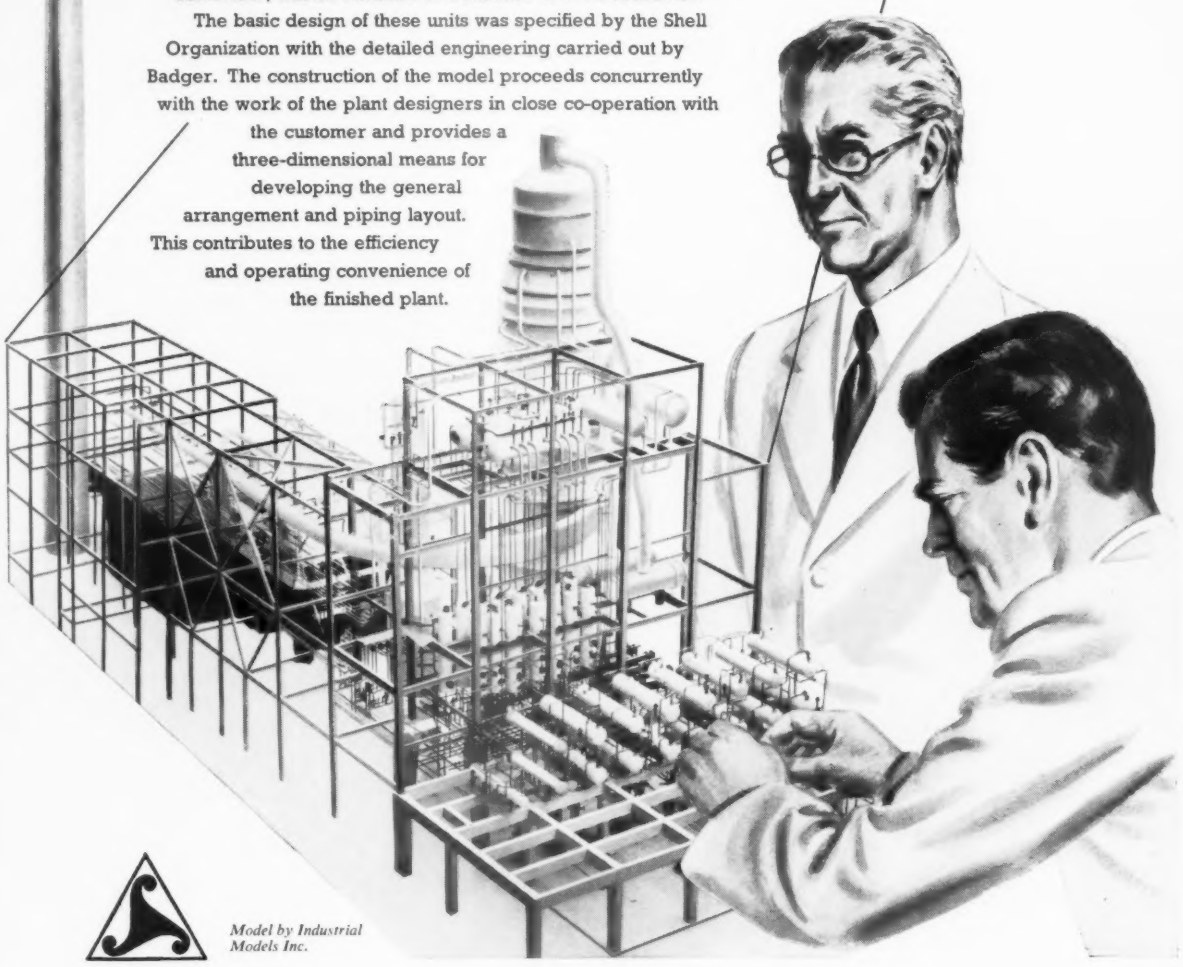

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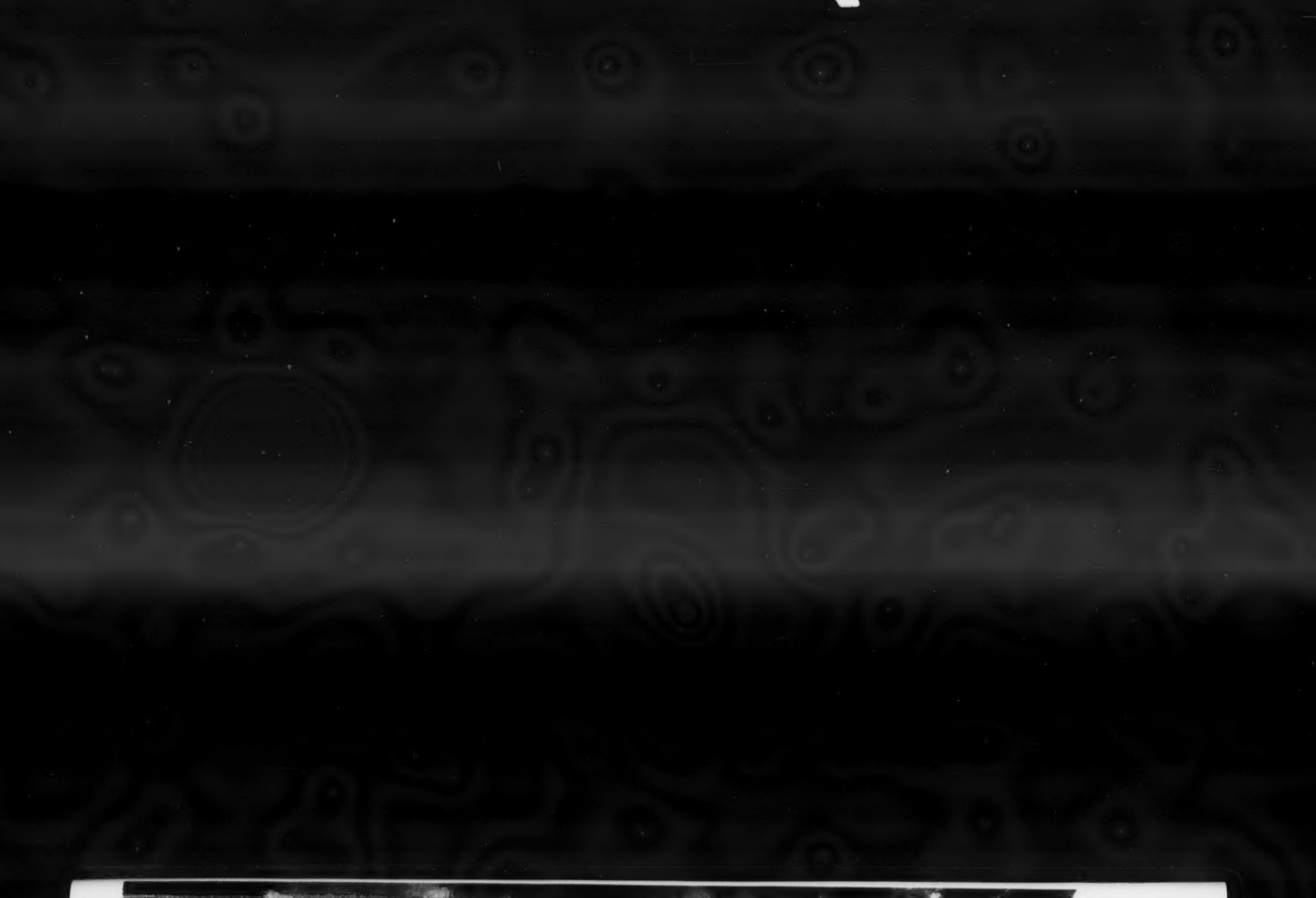
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